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THE MOUTH OF THE ESOPHAGUS.*

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The title of my paper may be received with some surprise. Has the esophagus a mouth? It will give me pleasure to present some data as the results of my recent careful research in the details of this question.

When the finger is introduced into the mouth of an adult, we reach at best the entrance of the larynx; and it is hardly possible to come to satisfactory conclusions concerning this matter. It is always difficult even for the experienced practitioner to introduce instruments into the esophagus back of the larynx. Practice is required to pass this point with ease.

Those who base their information on anatomical illustrations or on observations made on the cadaver cannot understand why it is so difficult to pass beyond the larynx into the esophagus, for in the cadaver no obstructions are apparent, and anatomists delineate this passage as they have studied it in the cadaver,—wide open.

More positive information may be gleaned by examination with the laryngoscope. To the inexperienced observer, the image presented in the laryngoscopic mirror does not indicate the position of the passage of the esophagus. This is corroborated by the queer answers given sometimes by students to questions concerning this point. Perhaps much of this confusion is due to the inversion of the picture of the larynx in the mirror, as the epiglottis is seen superiorly when in reality it is located anteriorly, and the arytenoid

* Read before the German Medical Society of the City of New York, June, 1907.

area is seen below when in reality it marks the posterior boundary of the glottis. According to this, it cannot be difficult to find the passage into the depth of the esophagus; as viewed in a laryngoscopic picture it must be situated below the posterior wall of the larynx, and may be diagrammatically represented by a single line. From this we may conclude that in the living subject the larynx lies close to the anterior surface of the spinal column, and that the passage to the esophagus is closed while at rest, that is, when not in the act of deglutition.

If we direct the patient to sustain a tone during examination with the laryngoscope, the course of the passage into the esophagus can be traced a little farther. During phonation the arytenoid cartilages are set in motion in a slightly forward direction, and are raised somewhat from the posterior wall of the pharynx. The movements of these cartilages are increased with the pitch of the tone. Thus an additional view of the depth of the trachea may be obtained, even to the upper border of the crichoid cartilage and laterally deep into the sinus pyriformis. This varies in different patients.

From the upper border of the cricoid cartilage, the passage appears tightly closed. It has been my impression, and possibly yours likewise, that this condition is due to the manner of suspension and fixation of the larynx by muscles and ligaments, while the muscles are completely inactive and in a state of rest, as in the cadaver. There is, however, a marked difference which first occurred to us when we attempted to pull the larynx forward from the vertebral column. In the cadaver this can be done easily when no muscle-rigidity exists. In the living subject, however, there is a marked resistance when the attempt is made. This can be easily proved on a lean neck by taking hold of the larynx in front and pulling it forward, or by pushing it forward with both hands from behind, or by grasping it with a forceps, taking hold in front, back of the cricoid cartilage. The resistance is enormous. The entire musculature in which the larynx is involved offers energetic though involuntary resistance. There exists, then, a tonicity of the muscles which maintains the larynx in its definite position and is only influenced by central impulses, as for example during deglutition, emesis, singing, etc., when changes in the position of the larynx take place.

I have observed in a number of cases that under special conditions a still deeper inspection may be made during phonation. If, during laryngoscopic examination, the patient is directed to bend the head well forward, and if the examiner views the larynx from below up-

wards, an additional stretch of the mucosa of the esophagus can sometimes be seen, corresponding to the upper of the cricoid cartilage. Now and then, I have even succeeded in obtaining a fleeting view down to the middle or even to the lower third of the crichoid cartilage.

This can be done very effectively by practicing the hypo-pharyngoscopy as suggested by von Eicken. In this technique the larynx is cocainized, and a strong laryngeal probe introduced into it, and the entire organ drawn firmly forward. Another way is to pass a suitable instrument back of the larynx and to pull it directly forward.

These investigations teach us that the pharynx in its whole width extends downward posteriorly to the larynx, and narrows rapidly to a small medial zone, situated in the region of the lower third of the cricoid cartilage. It can be plainly seen that the side walls converge to this point and that the anterior wall, represented by the posterior wall of the larynx, is also directed to it in a straight line. Another noticeable fact: The more traction brought to bear on the larynx, the more does the posterior wall of the pharynx bend in a gentle forward curve to the above mentioned area. This, then, presents a well-marked point of juncture.

The question is, in what manner does the esophagus extend downward from this area which we have described as its beginning? To attain better facilities for inspecting the depth of the esophagus, I made the attempt to pull the larynx away from the vertebral column more energetically than could be done from above. I availed myself of the opportunity to experiment on three tracheatomized patients in the following manner. The sub-glottic area was thoroughly cocainized around the tracheal wound. I then introduced a hook in an upward direction, and took firm hold of the crichoid cartilage itself. At the same time I made an inspection of the hypo-pharynx with the laryngoscope, directing the patient to bend the head well forward in order to relax the muscles of the neck. It was definitely determined by this technique that even with such intense traction the entrance to the esophagus (for as such we must evidently regard the above described area) cannot be made to gap. This orifice of the esophagus remains closed, and is pulled forward with the larynx. The posterior wall of the pharynx is tensely stretched, and well removed from the vertebral column above the entrance. So firmly is the orifice of the esophagus attached to the larynx that it is more readily drawn forward with the latter than that it is opened.

From this we must conclude that the mucosal surfaces in the orifice of the esophagus do not lie simply in contact with each other as in other similar mucous tracts, but that they are held tightly together by means of a tonic muscle contractility, a kind of sphincter. *A circularly arranged musculature distinctly guards the entrance to the esophagus.*

But furthermore, this musculature is evidently closely connected with the cricoid cartilage, or else it would not be possible to pull the orifice of the esophagus forward with the larynx when traction on the latter is made. Anatomical investigations prove that the portion of the constrictor inferior known as the crico-pharyngeus is thus closely connected. It begins on the side of the cricoid cartilage behind the crico-thyroideus, loops around the entrance of the esophagus, and reaches the other side of the cricoid cartilage. The element of tonic contractility of this muscle explains this phenomenon.

Additional data may be gathered by the employment of esophagoscopy. It is a simple matter to pass beyond the cricoid cartilage to the orifice of the esophagus with a properly selected esophageal tube, and then to push the tube into the depth of the esophagus while carefully inspecting this region. Here we find in an area of several centimeters a tightly closed passageway, the mouth part of the esophagus, the walls of which are made to open sluggishly by the pressure of the esophageal tube. From this point downward extends the open portion of the esophagus. A similar observation is made during the withdrawal of the tube, as has already been noted by von Mikulicz. In his treatise on esophagoscopy and gastroscopy, published in 1881, he observed that the entrance to the esophagus is kept closed by the constrictor inferior. As I have demonstrated, only the cricoid cartilage portion of this muscle is called into action, but evidently also the upper part of the orbicular muscle of the esophagus.

The fact that the esophagus from its beginning to its termination at the cardia consists of an open air-filled tube has been proven beyond a doubt by Mikulicz, who has also demonstrated this physiologically. The accuracy of this observation is proved in every esophagoscopy. Mikulicz has also demonstrated that the air in the esophagus is subjected to negative pressure. I thought for a time that this negative pressure might, perhaps, explain the closure of the orifice of the esophagus, and have attempted, while performing deep hypo-pharyngoscopy, to introduce a catheter into the air-space of

the esophagus. The orifice of this organ closed spasmodically around the catheter, but showed no tendency to gap.

This assumed sphincter closure of the orifice of the esophagus may well be compared with the similar function of the cardia of the stomach. The cardia is also closed by tonic muscle-contractility. This contraction is released reflexly during deglutition or emesis. What is the conduct of the mouth of the esophagus in this respect? I can present a series of most interesting observations regarding this. One case which especially directed my attention to these conditions has been reported by Karl von Eicken in his essay on hypo-pharyngoscopy. The irritation produced by the laryngoscopic mirror produced sensations of choking in a female patient. Von Eicken observed that a deep inspection of the hypo-pharynx orifice was wide open. In a favorable moment I had the opportunity to observe a most unusual phenomenon. *In the area of the lower third of the cricoid cartilage a thick, crescent-shaped fold protruded bilaterally from the posterior wall of the hypo-pharynx forward to the cricoid cartilage.* When we desired to make a further inspection of this condition, the patient unfortunately failed us, and would not open her esophagus again. This phenomenon impressed me greatly. I recognized the importance of this observation, and it occurred to me at once as similar to that known as Passavant's fold, which is formed, as we remember, in the region of the upper end of the constrictor superior opposite to the velum platinum, when the epi-pharynx is closed during speech or deglutition. Much to my regret, the patient would not submit to further examinations, and I was unable to get more specific data concerning this occurrence. The question was lost sight of until early this year, when the same patient presented herself again at the clinic. On this occasion, it was easy to produce the reflex choking sensations by tickling with the laryngoscopic mirror, resulting in dilation of the mouth part of the esophagus, and to expose to view convincingly and clearly this crescent-shaped fold, the lip of the mouth of the esophagus.

It was now to be determined whether this lip was an accidental anatomical peculiarity of our patient, or whether it was a usual occurrence. To this end I employed hypo-pharyngoscopy on a number of patients and attempted to produce symptoms of retching. While I was not always successful, I was able to produce the same results as in the above mentioned patient in a sufficiently large number of cases. The mouth of the esophagus gapped wide during the time of retching, and the crescent-shaped fold came plainly into

view. It was evident that it could not be simply a fold in the mucous membrane, but undoubtedly partly composed of muscle tissue. My experiments were unsuccessful when the retching was of so violent a character that no systematic observations were possible. By cocainizing the parts well, the entire process could be so modified that another positive result was obtained. The regular occurrence, then, of this crescent-shaped lip of the mouth of the esophagus during retching can hardly be doubted. But, furthermore, we learn that the mouth of the esophagus acts like the cardia at the time of retching, which forms only a part of the process of vomiting, and during this process the cardia gaps at the same time with the mouth of the esophagus.

Observations of the conditions during deglutition were still wanting. The movement of retching is a retrogressive one, while that of deglutition is progressive. The technique of hypo-pharyngoscopy by means of von Eicken's modification of H. P. Mosher's long straight spatula gave me the opportunity to see this muco-muscular ledge during deglutition and also to observe the opening of the mouth of the esophagus. All the patients whom I examined in this manner could swallow with ease during the insertion of this narrow spatula. The lip of the mouth of the esophagus was thus exposed to view, and the mouth itself dilated.

It cannot be doubted, therefore, that a contraction-mechanism is located in the orifice of the esophagus similar to that in the entrance to the stomach. The observation explains a whole series of phenomena which, until now, were more or less obscure.

It is known that some persons are able to pass large quantities of fluid into the stomach without visible signs of deglutition after one or two efforts at swallowing have been made. The heroes of the "Kneipe" are a striking example. Evidently, the tonic contraction of the sphincters at the orifice and at the end of the esophagus is temporarily suspended by will-force in these cases.

We are probably correct in the assumption that the sensation of contraction and of the presence of a globus in the throat may be associated with marked contraction of the mouth of the esophagus. I recall to you the sensation during the act of rapidly swallowing highly carbonated waters.

Strictures following corrosion of the mucosa of the esophagus are frequently localized in the region of the mouth of the esophagus, because the acids have come more intensely in contact with this area. It is possible that the mouth of the esophagus presents a hind-

rance to the free passage of such acids notwithstanding the effort at deglutition because of this special contractility.

The mouth of the esophagus is also a favorite site for the lodging of foreign bodies. These coming in contact with the mucous membranes produce a contraction of the sphincters. I recall two cases, when coins had been swallowed which stuck in the mouth of the esophagus, where I could see distinctly a ring of contraction around the coin which offered considerable resistance during extraction.

Improperly masticated food containing coarse particles produces a similar irritation to that of foreign bodies. Only a soft food-bolus passes easily beyond the constricted portion of the esophagus. This accounts for the well-known spasms of the esophagus in cases where rapid deglutition of improperly masticated food-masses has been practiced for years. I have seen a large number of cases of this kind. The patients locate distinctly a feeling of constriction in the region of the mouth of the esophagus and complain that food passes this point with difficulty. Spasms of the esophagus may be co-related with spasms of the cardia, and both are frequently due to secondary neurosis in chronic diseases of the stomach. In explaining the dilation of the esophagus following spasms of the cardia, the possible relation of the mouth of the esophagus must now always be considered. This dilatation is more easily comprehended when we consider that the bolus is compressed between two sphincters.

These observations may throw some light on the question of the origin of pulsating diverticula of the esophagus. We now know that these diverticula should not be considered as belonging to the esophagus, but rather to the hypo-pharynx, because in all instances they are located above the crescent-shaped lip of the mouth of the esophagus. This lip is identical with the ledge of the diverticulum, as I have previously designated it. Dissections of the musculature of this area when such diverticula exist substantiate my theory. The hypertrophied fibres of the crico-pharyngeus pass through the ledge of the diverticulum, which extends backwards, and must be included in the posterior wall of the hypo-pharynx. It is easily comprehended that this wall must distend with increased pressure during deglutition, for the anterior wall of the hypo-pharynx is formed by the posterior surface of the cricoid cartilage. A small pocket located above the lip of the orifice of the esophagus may gradually widen, and develop to a sack of considerable size. As a rule, this condition is observed in patients of advanced years, who have been in the habit of masticating poorly and swallowing rapidly.

These pulsating diverticula are analogous to dilations of the esophagus following spasms of the cardia. We may safely assume that spastic irritations in the mouth of the esophagus may contribute somewhat to the formation of such diverticula.

I do not wish to claim that this theory concerning the formation of diverticula in the region of the hypo-pharynx is sufficient. It is not to be concluded that this mechanical theory concerning the formation of diverticula in the region of the hypo-pharynx, which has been inaugurated by Zenker, is sufficient to explain it. It is well known that von Bergmann has always claimed that heredity is the cause of such diverticula. In my opinion both theories are probably well founded. It appears to me that diverticula with narrow orifices occurring in young subjects can scarcely be considered as of distinctly mechanical origin. We have lately had such a case under observation, and have studied it with all the means at our disposal. Here the impression prevailed that there must have been a predisposition to the formation of such a diverticulum, which developed mechanically into a sack. I remember from my investigations concerning the bursa pharyngea that in certain mammals pharynx diverticula in this region are a common occurrence. Why should not this be the case in man, though, of course, in very rare cases? Perhaps chance will answer this interesting question for us some day.

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LOSS OF VOICE IN SINGERS.*

MR. W. J. HENDERSON, NEW YORK CITY.

Finding myself by some strange freak of fortune asked to disclose my opinions in the presence of scientific men who deal only with facts, I take refuge in the comforting reflection that sometimes even the doctor has to guess again. What I have to put before you is the meagre result of twenty-five years of observation and study as a music critic. I have in these years been a "looker-on here in Vienna." You have been lookers-in. I have listened to what came out of throats and wondered sometimes how it could, while you have had opportunities to look into the throats and see what these extraordinary emissions, called singing, have done to them. If my fund of information lacks scientific value, perhaps it may interest you as the view of a rank throat outsider.

In all of the years of my service as a critic, I have noted but one case of actual loss of voice, traceable, perhaps, to diseases not caused by misuse; but I have seen many of artistically fatal deterioration, unquestionably caused by bad singing. The possessors of these deteriorated voices could still emit tones of more or less discomforting quality and marrow-touching power. With the aid of former reputations, stimulated by the efforts of youthful and ingenuous reporters, these singers continued to throw vocal dust into the eyes of the public, which is easily led to believe that one employed at the opera and receiving a large salary, must be a great artist. Opera goers, of all music lovers, are the most afflicted with tone deafness, and they have an especial predilection for people who sing very loudly and a little off the pitch.

After all these years of observation, I have come to the conclusion that the principal cause of voice deterioration in singers is method. There are to-day not less than what Omar Khayyam would have called two-and-seventy jarring sects in vocal method, and the children of every one of them are perfectly certain that the disciples of the others are musically damned beyond redemption. Naturally, pupils are in one of two states: either they have a wrong method of singing, or they have so many methods that they have none at all.

* Paper read by Invitation before the Laryngological Section of the New York Academy of Medicine, April 24, 1907.

Students of vocal art might possibly escape the dangers of too many methods, if they were less eager to become great opera singers and get a thousand dollars a night. But, alas! if they shun Scylla, they are likely to fall upon Charybdis. If they obtain not too many methods, they are almost certain to acquire too much method, and the last estate is as bad as the first. Consider first the fate of the youthful student who is burning with the get-rich-quick fever, and is eager to go before the public at once. Pupils of this type study a few months with one master, and finding themselves unprepared to deliver "Ritorno vincitor" or "Dalla sua Pace," rush off to another. All these teachers have fads. Each one professes to have found in some particular the great fundamental law of tone formation. The pupil gets one theory from this teacher, another from that. He makes no progress, and in a year he knows less about the art of singing than he did before he began to acquire misinformation about it. Finally he comes to the conclusion that he knows as much as any of the teachers, and he forthwith embarks upon his career unequipped with any principles of voice production. He is continually experimenting on his own voice, and always laboring under the fear that it does not carry. Consequently he sings as hard as he can and tears his poor throat to pieces. The inevitable result is either relaxed vocal cords or those disastrous little swellings with which all of you, gentlemen, are familiar.

Now let us consider the case of the victim of too much method. Too many of the vocal teachers of to-day teach not tone, but physiology. Instead of being musical professors they strive to be instructors in anatomy. Permit me to illustrate what I mean by pointing to an example. I sometimes send pupils who have fallen into injurious habits to a teacher who can dissect a larynx with the skill of a physician. He knows the offices of the muscles and the nature of the cartilages. But he utilizes that knowledge in his teaching in the only way in which a teacher should use it. By means of it he discerns what artificial pull or constriction each pupil has acquired, and puts him through a course of vocal exercises designed to correct the habit. But he does not tell his pupil what muscle to contract in order to counteract the damaging strain on the other.

This is diametrically the opposite plan practiced by the typical singing teacher. Knowing the anatomy of the throat only in a vague and unscientific way, he attempts to teach physiological singing. He tells the pupil that for this tone he must raise the soft palate, and for that he must lift the larynx. For this tone he

must think of his epiglottis, and for that he must never forget that the anterior portion of the vocal cords alone is in vibration. In a word his system is to proceed from the mechanics to the tones,—to teach the pupil how to pose his vocal organs in order to get the right sound. The greatest teachers of singing that ever lived were those of the latter end of the seventeenth and the beginning of the eighteenth century. Porpora, Redi, Fedi, Bernacchi, Pistocchi,—these were some of the men who gave the world the mighty singers of the Handelian era, Farinelli, Caffarelli, Faustina, Tesi, Cuzzoni, and their compeers. These teachers lived long before their distinguished successor, Manuel Garcia, devised the laryngoscope, and long before masters of the voice knew much, if anything, about the anatomy of the throat. These teachers taught according to the empirical method, from the tone to the mechanism. They endeavored to bring their pupils to a conception of the ideal singing tone, and then to teach them to hear themselves. Their fundamental principle was that, if the tone is perfect, the vocal organs will be acting according to their nature, and the voice will be strengthened and not injured by the normal exercise of its artistic function in song. Their ideal was complete absence of all constriction or hardening of throat muscles, perfect ease and elasticity of the entire vocal apparatus, from the bottom of the chest to the tip of the tongue, an expenditure of just as much breath as the tone required, and no pushing, pulling, or forcing of any kind whatever. Beauty of tone and flexibility of delivery, such as they taught their pupils, could only be acquired when all the organs were in an absolutely elastic state. That was the vital truth which they recognized and they contented themselves therewith. The modern teacher too often strives to substitute for a conception of the ideal tone a mental picture of the operations of the throat in its formation, and the result is a destructive attempt on the part of the pupil to operate voluntarily parts which nature never intended to have brought under the direct control of the will.

These two things, ignorance of any method of singing and acquaintance with a radically incorrect method, are the most prolific causes of voice failure among singers. Let me now specify one or two of the exemplifications of bad instruction. One of them is to be found in strained and unnatural methods of breathing. Among singing teachers there are more theories of the manner in which a human being draws his breath than any of you physicians ever dreamed. What you do not know about the right way to inspire

and expire would fill fifty volumes the size of Austin Flint's "Practise of Medicine." One teacher puts so much stress upon the matter of breathing that he has forgotten how to teach anything else. The result is that his pupils are a set of walking wind bags, but they cannot make tones. An expansion of three inches is regarded with contempt in the classes of this teacher. Likewise does he sniff at a mellow and far-reaching pianissimo, such as Sembrich sometimes floats to the galleries of the Metropolitan. "Blow winds and crack your cheeks?" cried King Lear; blow winds and crack a voice is this tornado method.

Breathing exercises are, of course, desirable as long as they follow the method of nature, but unfortunately most breath specialists teach their pupil that the prime requsite is a vast volume of breath. Some of these poor deluded students struggle to govern their tones with their chests strained to the utmost expansion and their throats tied up in knots to prevent the air from bursting forth in one fell swoop. Their attitude and state in the act of vocal delivery suggests the existence of painful laryngeal constipation.

I am convinced that bad attack is one of the commonest causes of deterioration in the quality of voice. The ideal attack of tone is seldom acquired. Sometimes nature bestows it upon a singer as she did in the cases of Patti and Melba. When Mme. Melba opens her mouth the tone flows out like sparkling water. The ear cannot detect any attack. Most singers begin, especially when the attack is on an open vowel, either one way or another that is wrong. Some send out a portion of the breath before bringing the vocal cords together, so that previous to the beginning of phonation we hear a hissing sound. This is the aspirated attack. The other bad habit consists in firmly setting together the cords and hurling them apart just before the breath reaches them. This trick causes every attack to begin with a clucking sound, and is known to the singing profession as the "stroke of the glottis," an unscientific description whose origin you, gentlemen, can easily discern. The second of these tricks is more injurious to the voice than the first. Indeed, I am not certain that the first works any physical injury at all, while I feel quite sure that the second does. In fact, I believe, though I hesitate to offer an opinion in this presence, that it is one of the most destructive of all vocal practises. It is in high favor in France where singing voices rarely have the liquid mellowness and pearly purity found in the best Italian and American organs. I am inclined to believe that it is found most frequently in company with

that piercing metallic quality which is so dear to habitues of the Paris Grand Opera, and which Lucinne Breval and Aino Ackte so vainly endeavored to induce Americans to like. Dr. Holbrook Curtis, who has had large experience with singers, believes that the forcible stroke of the glottis is death to the voice. I cannot, of course, presume to comment either favorably or unfavorably on a physician's dictum; but I am prepared to say that I have noted a dozen cases in which persistent employment of this method of attack has robbed the voice of all its vibrancy, and transformed its quality from that of a silver flute to that of a wooden xylophone.

Two more agencies in the destruction of singing voices must be noted. Of these one has found a happy hunting ground in the Metropolitan Opera House. This is the Big Tone habit. Every one burns with ambition to play the lion, like Bully Bottom, and roar so that the Duke will cry, "Let him roar again." The Duke in this case happens to be a long row of imported opera goers who stand behind the orchestra rail and shriek "bravo, bis!" every time they hear a loud sound. They set a terrible temptation before the singer, whose sensitive spirit yearns for signs of approbation. If he can get them by throwing artistic chastity to the winds and prostituting the physical beauty of his voice to the carnal desires of these creatures, it is hard for him to resist.

I am certain that most of you are familiar with the American demand for the biggest in everything. The intrusion of this demand into the realm of musical art is not recent. We ask for the biggest choruses, the biggest orchestras, the biggest organs, the biggest salaries for conductors in all this world. It is small wonder that when we go to hear singers we ask for the biggest voices, and it is not at all strange that the singers strive to meet our demand. Our opera houses resound with the noise of mighty bellowings, and this glad sound gives the people great joy. It would be impertinent for me to tell you, gentlemen, what the physical result must be. You know better than I do what becomes of the resiliency of muscles and ligaments continually strained to their utmost. The normal sonority and vibrancy of voices gives way to a wooden reverberation which is as unmusical as the hammering of paving blocks. But still the merciless public goes on clamoring for the big tone, the huge sound, and year after year beautiful voices are sacrificed to this pitiless Moloch.

This form of overwork of the vocal organs is associated with another equally destructive, and that is singing too often. All

singers are willing to overwork themselves. I have heard some of them advance the comforting theory that it was better for them to sing all the time than twice a week. If they would always sing well within the power and compass of their voices, doubtless daily exercise of the organs would be beneficial. But surely daily strain is not. But here again enters the get-rich-quick fever. Sing often, and get more salary; that is the golden rule of the thrifty artist, whose art is usually dear to him precisely in proportion to the amount for which he can sell it.

One more cause of vocal deterioration must be mentioned. In my opinion this is the most dangerous and common. Nearly all singing teachers profess to enlarge the compass of the voice. That teachers offer to do this is an evidence of the existence of a demand for it. The truth is that every singer is desirous of possessing an amazing range of tones. The bass boasts that he can sing the F above his clef; the baritone that he can sing high G; the tenor waxes proud and haughty when he can go his breed one better, and can sing high C sharp. The contralto carries a nose pointed toward heaven when she can sing soprano roles, and the soprano is filled with pomp and pride and circumstance when she can boast a range of two and a half octaves. She would then speak disparagingly of Agujari—if she had ever heard of her.

Opera singers are continually striving to sing roles for which Nature never intended them. They labor and strain and outrage their throats day after day with exercises for extending the compass. Their exercises, you will permit me as a student of the technics of singing to say, are devised on a plan contrary to common sense, and are damaging to the vocal organs. Allow me to illustrate by physical analogy; an athlete does not acquire muscular strength by daily exercises which overtax him. The man who hopes to become a dumb-bell raiser does not set out with 140 pounds as his standard and torture his muscles to get to do it. The man who aspires to become a sprinter does not bind himself to do a hundred yards in ten seconds flat. Each of them aims so to develop his powers by normal and comfortably borne exercise that, when once in a while a supreme effort is required, the elastic and responsive muscles are capable of it. When that effort is made, it goes just to the limit of that particular man's physical powers, and not a jot beyond them.

But when a woman whom nature gives a voice suited to such roles as Fides in "La Prophete," determines she is going to sing

Amneris in "Aida," and begins laboring to hoist her voice up to the necessary range, she can only do so at a sacrifice of the noble lower tones which God gave her, and that, too, without getting anything valuable in exchange. The tones of forced up voices always sound strained and in time are lost. So, after all the artificial career is short-lived and the proud singer is in the end exposed to humiliation. In many instances the beauty of the voice is entirely obliterated by these struggles to alter its nature. Doubtless in some cases actual loss of voice results. At any rate, I am inclined to believe that the one case of actual loss which has come under my observation was an essay at singing roles which required a high, brilliant and vigorously declamatory delivery from a singer whose voice and acquired style lent themselves rather to smooth, sonorous and beautiful production of tones ranging two octaves upward from A below the staff. Please do not misunderstand my point here. I do not mean to say that this singer could not sing a C above the staff, and that singers with voices in the medium scale may not safely sing high tones occasionally. What I regard as dangerous is the effort to sing roles of which what the Italians call the "tessitura" is too high. That is to say, the average, or rather the major portion of the part is too high. The voice which is at home in the middle of the scale is kept continually singing in the upper register, where it cannot stay without severe labor and distressing strain on the whole tone-producing apparatus.

It is pretty difficult, perhaps impossible, to say what can be done about this. It is a matter entirely in the hands of the public, and it could not be in worse ones. The public demands brilliancy. It revels in high tones. There is more satisfaction in an opera house over one high C than over many perfect interpretations of "Voi che sapete" or "Ah si ben mio." If Mme. Sembrich does not take the high D flat at the end of the sextet in "Lucia," there is a feeling of noticeable disappointment. If Mr. Bonci interpolates a high C in the sextet in "Les Huguenots," there are general demonstrations of great joy. When it is announced that Mme. Fremstad, who used to be a contralto, is hereafter going to be a soprano, women smile at one another and men shake hands. Meanwhile the business of the laryngologist grows apace, for these outraged throats have to be taken very often to the doctor, whose excellent advice that they need long rest is systematically ignored because that way lie silence, the departure of glory and the dark, dismal absence of dollars.

I do not imagine that I have said anything which you did not know before. All that I have said about opera singers applies to singers in other fields. Insufficient knowledge of vocal art, a foolish belief that they have learned how to direct their own cricothyroid muscles through the acquisition of some half-baked anatomical information, the big tone and get-rich-quick crazes, and the general want of high, artistic ideals,—these are the chief causes of voice deterioration which have presented themselves to my observation. You gentlemen will, of course, know at once the physical results of the injurious practices, and for that reason I have not had the temerity to mention them. I do take the liberty of reminding you, however, that medical science has a hard battle to fight in treating all the afflictions brought on by ignorance, neglect and downright wickedness.

"New York Sun."

Case of Esophageal Stricture Cured by the Use of Thiosinamine.

HEINRICH HALASZ. *Monatschr. f. Ohrenh.*, Berlin, Dec. 1904.

A boy, 17 years old, who attempted to commit suicide by drinking sulphuric acid, had a stricture of the eosophagus, 14 cm. from the teeth, which would not permit a bougie, 3 mm. in diameter, to pass. Six injections of 1 cc. of a 15 per cent. solution of thiosinamine were made between the shoulder blades, at intervals of three days, and bougies were passed daily. At the end of this period the patient could swallow well and a large bougie could be passed.

YANKAUER.

THE INDICATIONS FOR AND THE ADVANTAGES OF THE INTRANASAL ROUTE OVER THE RADICAL OPERATION IN THE TREATMENT OF CHRONIC SYMPTOMS OF THE ANTRUM OF HIGHMORE, AND THE TECHNIQUE EMPLOYED.*

BY ROBERT C. MYLES, M. D., NEW YORK.

After twenty years of experience in treating diseases of the Antrum of Highmore, the writer has arrived at the conclusion that 85 or 90 per cent of the cases demanding surgical interference should be operated upon by the intranasal inferior meatal route.

When considering an operation upon the Antrum of Highmore by the intra-nasal method, one should be thoroughly familiar with the many possible anatomical irregularities, and should analyze them carefully before making the operation. This is especially true of the small antrum with its floor situated above the level of the floor of the nose. The area of election for operative procedure is a space on the naso-antral wall between the floor of the nose and the attachment of the inferior turbinated crest. The practical available dimensions are about one inch antero-posteriorly, and one-fourth to three-fourths inch vertically. Parts of three bones go to make up this operative area; viz., the superior maxillary, the palate and the inferior turbinate. They are very thin, but of flinty hardness. The thinnest segment is the upper posterior part; the thickest is the lower anterior section. The posterior three or four millimetres of this wall usually contains the posterior palatine canal, through which pass the posterior palatine vessels and nerves. Great care should be exercised to avoid wounding this canal and its contents. The nasal ostium of the naso-lachrymal duct is situated anteriorly and superiorly to this surgical era, and it is wise not to cut nearer to this ostium than four or six millimetres.

In the milder cases, I have occasionally operated through the wall of the middle meatus, in some instances removing the lower lip of the hiatus semilunaris and cutting away the wall down to the crest of the inferior turbinate bone. For the initial incision, a short stiff knife is employed, having the blade set at right angles to the shaft and slightly hooked at the end. This is followed by the use of the author's punch forceps and the chisels which cut outwardly.

* Read before the New York Academy of Medicine, Section on Laryngology and Rhinology, March 27, 1907.

Other cases I have operated upon with the same technique through the middle meatal wall on a lower plane than the hiatus and about one-half to three-fourths of an inch further posterior where there is usually a dehiscence in the bony wall However, I have not found this route desirable in cases of extreme and extensive disease.

One of the chief advantages, negatively speaking, of the intra-nasal over the extra-nasal route, is that the operator is not able to thoroughly curette the antrum, one of the evils of the radical operation concerning which the writer has warned the profession on different occasions for many years.

In a paper read before this section on the fourth Wednesday in January, 1893, and published in the *New York Polyclinic Journal* February and March, 1905, we said: "An operation which we have performed with some good results consists of sawing away the anterior end of the inferior turbinated bone from its attachments to the superior maxilla, and then clipping off about one-half inch with the curved scissors. This usually affords a good opportunity to pass a trephine or drill into the antrum, and allows curetting, packing with gauze, and subsequent irrigation. Cocaine, properly applied locally and hypodermically, allows this operation to be done without giving rise to much pain. The bleeding is usually free for a time, and is the most annoying consequence. It is difficult to curette the parts well through an opening in the inferior meatus, as it is almost impossible to cover all the area, even with the malleable-handle curettes." I also presented a case at that meeting which had been operated on by the intra-nasal route illustrating the method employed. At that time the results obtained were not so brilliant as now, because the openings made with the trephine and drill were too small for free and permanent drainage and ventilation, and apertures frequently healed over in a few months. Some of these cases recovered entirely, while others were later relieved through the canine fossa and malar ridge. It was observed that a decided and permanent improvement was secured *pari-passu* as the size of the hole approached the dimensions of one-half by three-fourths of an inch.

In a paper read before the 27th annual congress of the American Laryngological Association, June 1st, 1905, I said that after having performed several hundred operations through the canine fossa and malar ridge, and more or less thoroughly curetting the antral

walls, I had practically abandoned that procedure, in favor of the intra-nasal route.

In my opinion the intra-nasal route should be adopted in all cases except those in which there is positive evidence of dead bone or neoplastic growth within the cavity, and even in those instances it is at times expedient to do an exploratory operation through the inferior meatus. Only about one-tenth of the cases which have pus within the antra require operative interference, at least this has been the result of my observation and experience. Muco-pus in the antra, following an acute influenza or acute rhinitis, usually lasts

Fig. 1.

from three to six weeks and the patient's recover without any interference. This class of sub-acute cases should be excluded from our consideration of empyema of the antrum of Highmore, but if we are simply looking for more walls to hew and hack we could increase our statistics to any desired number and report antra which at operation were filled with muco-pus.

It is the chronic case which neither time nor irrigation through the natural opening seems to aid, that demands surgical interference.

The writer presents several instruments which he has found almost indispensable for securing a large enough aperture. The first

steps in the technique are practically the same as those described in his paper fourteen years since.

Half an inch of the anterior end of the inferior turbinal is removed by making an initial incision with a saw (Fig. 1) and continuing the same with a heavy pair of Knight's scissors (Fig. 2.) along the attachment of the turbinal to the superior maxillary bone and the inferior turbinated crest. A cross-section is then made with a Bosworth or a Jarvis snare (Fig. 3), care being exercised to remove only a part of the anterior third of the inferior turbinated bone. Fig. 4 demonstrates a condition where too much of the in-

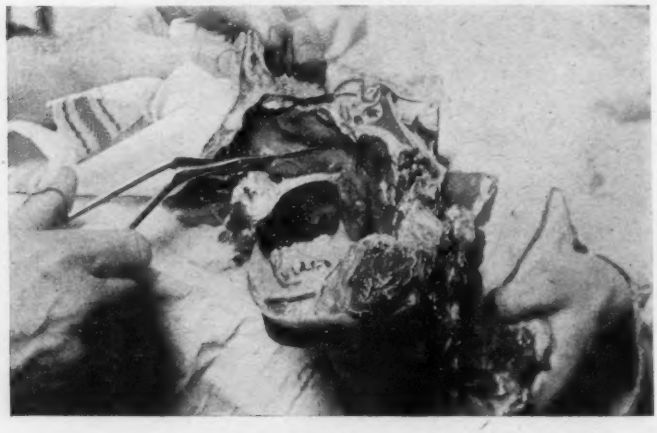

Fig. 2.

ferior turbinal has been removed. A small firm tampon placed beneath the turbinal in some cases will lift it upward and against the septum out of the field of operation. In addition to the surface and infiltration methods of applying cocaine, the writer now uses 1-1000 solution of adrenalin in the same manner. He also uses his long sharp and blunt-pointed platinum needles.

In many cases where there is an extreme deviation of the septum toward the side of the operation, I force the septum over temporarily and use a small curved chisel, operating almost entirely by the sense of touch and a knowledge of the unseen anatomy. A curved chisel, either semi-cylindrical or V-shaped (Fig. 5) is placed

high up near the crest and made to penetrate in an outward and upward direction, in order that the first entrance may be easily made and that the size of the antrum may be determined by the flexible probe before further steps are taken.

At this stage the author introduces about 6 or 10 drops of a ten per cent solution of cocaine, with six or ten drops of 1-1000 solution of adrenalin. If the field is clear he then makes two or three additional punctures lower down or enlarges the original opening. If it is a case in which the field of operation can be readily inspected,

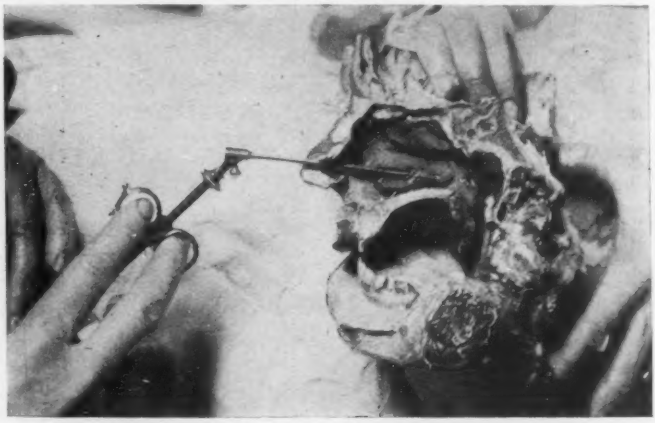

Fig. 3.

a specially constructed Curtis trephine is used to enlarge the opening downward as near to the floor of the nose as possible. When operating many years since, he noticed that an ordinary nasal trephine would cut the mucosa at the point where the hole is made in the barrel near the shaft. If the nasal chamber is of sufficient size to allow the use of the large strong punch forceps the desired amount of bone is easily removed; on the other hand, if the naris is very narrow it is necessary to use the small size punch forceps, as well as the small chisels which cut inwardly and outwardly. The use of a hammer and sharp chisel which is not allowed to bite too large a piece rarely causes objectionable jarring of the head.

The bone near the floor of the nose is usually very thick and hard, and is best removed by drill and trephine when it is possible to use them.

The writer presents a curette with eight blades (Fig. 6), four of which cut the margins of the upper walls, and the other four the inferior margins of the lower wall. It is set in a shaft and handle seven and one-half inches long, and is placed at right angles to the shaft. There is a head on the distal end of the curette 6 to 10 mm.

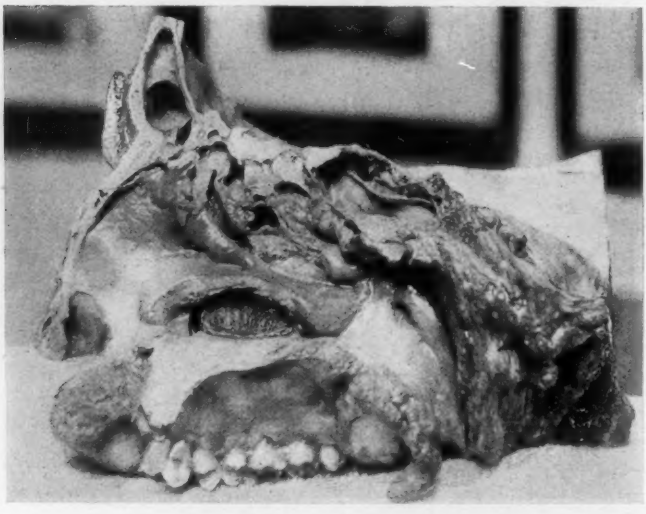

Fig. 4. Turbinotomy Inferior. Showing too much Removal.

in diameter, which slides along the inside of the antrum and holds the curette in position while the operator is enlarging the opening in the direction he may elect. This instrument is made in three sizes by W. F. Ford & Co.

The writer also makes use of six circular chisel punches, four of which cut both ways, and three or four of which cut only towards the outward stroke. He has been able to use these successfully when other instruments and methods have failed.

The punch forceps are introduced closed, and when the blades are near the perforation they are opened. The uppermost one being

at right angles to the shaft, is introduced through the hole made by the chisel, and the posterior part of the meatal wall is carefully and rapidly bitten away to within a few millimetres of the posterior palatine canal.

A pair of strong-bladed punch forceps is then introduced for the purpose of cutting away the superior part of the bony wall, which

Fig. 5. V-shaped Chisel.

bone is situated just beneath the crest of the inferior turbinate. These forceps are placed on a shaft three and one-half inches long, which has a curve on the distal end of about 45°. A curved chisel, made after the triangle or Killian pattern, has the greatest efficiency of any, when we consider the dynamics of the impact of the hammer.

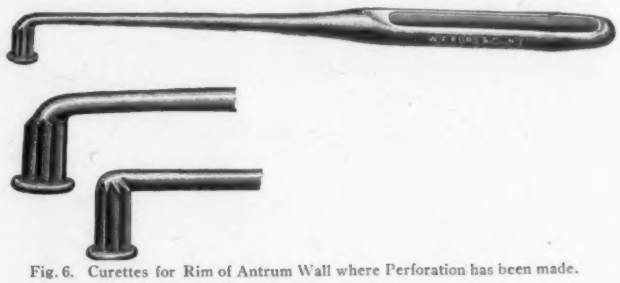

Fig. 6. Curettes for Rim of Antrum Wall where Perforation has been made.

When an opening has been secured three-fourths of an inch to one inch long, antero-posteriorly and one-third to three-fourths inch vertically, all the edges of the hanging mucosa and periosteum are trimmed off, the cavity is carefully curetted in all possible directions with the malleable handle curettes, and after an insufflation of powder of boric acid and aristol—equal parts—the cavity is packed moderately firm with one-half inch iodoform gauze, as is also the region of the inferior turbinal wound.

After 48 hours all packings and dressings are removed and left out permanently. I have found that many cases do better without frequent irrigation, and consequently allow some cases to be washed out only once in several days. Daily insufflation through a silver catheter of two or three grains of the aristol and boric acid powder has seemed to be the most favorable dressing for the average case.

In several of the cases in which polypi filled the antrum, causing distressing asthma, bronchitis, and general emaciation, the patients have made more favorable progress after this operative procedure than those who are operated upon by the canine fossa and malar ridge methods. In a series of these cases, I have noticed that the antrum would be entirely free of the muco-purulent secretion for months, and that when a general acute cold or rhinitis occurred the antrum would refill for a week or two with the muco-purulent secretion which would again disappear as soon as the general symptoms ceased.

I have watched for evil or unfavorable consequences from this procedure, but have not noticed that any permanent impairment of the nose, rhino-pharynx, or larynx could be traced to the absence of the small piece of turbinal and the partition between the inferior meatus and the antral cavity.

I am pleased to have an opportunity to again repeat and emphasize my opinion, expressed so frequently before this section, that the essential and most desirable condition for any diseased sinus of the head is that its free drainage and free ventilation be secured and maintained, excluding those smaller and minute cells where obliteration is indicated.

46 W. 38th St.

TUBERCULOSIS OF THE ACCESSORY SINUSES OF THE NOSE.*

BY J. W. GLEITSMANN, M. D., NEW YORK.

Although Tuberculosis of the Accessory Sinuses is a rare occurrence and more of pathological than clinical interest, it is, nevertheless, of sufficient importance to engage your attention in more than one direction.

Pulmonary tuberculosis furnishing by far the largest mortality, it would not be surprising, if, in life or at least at post mortem, accessory sinus diseases were more frequently observed, and investigations as to their relation are not missing. Of the many authors, who examined the sinuses of patients having died from tuberculosis, I shall quote only a few. Wertheim[1], found in 306 post mortems 165 times, and amongst 106 tuberculosis subjects 31 times accessory sinus disease in general. Minder[2] found in 17 tubercular cases the sinuses diseased four times. E. Fraenkel,[3] in 48 cases, 9 times. Dmochowski[4], confined himself to the maxillary sinus and saw in 29 tubercular subjects only 3 times pathological changes. He is also the only one, who, to the best of my knowledge, and with a careful search of the literature, found tubercle bacilli in an accessory sinus, viz., the maxillary, which had not been diagnosed or treated during life. A much larger ratio appears in a recent publication by Oppikofer,[5] viz., 25 sinus affections in 51 tuberculosis cases. But with the exception of the last author the writers are not inclined to believe tuberculosis to be a preponderant cause for general sinus disease, other affections, especially empyema, being by far more prevalent.

It is difficult to determine the etiological factor in many instances, as several writers confine themselves to the short report of the observation of a case and important data are missing. But from the histories furnished, we learn, what is to be expected, viz.: that the majority of sinus tuberculosis is due to an extension from a neighboring tuberculous focus. Of the twenty cases of tuberculosis of the maxillary sinus, which I could find, twelve were due to tubercular lesions of the bones of the nose or upper maxilla, whilst in the remaining eight carious processes of these parts can be ex-

* Read before the Twenty-ninth Annual Congress of the American Laryngologica Association, Washington, D.C., May 7, 1907.

cluded. The majority of patients suffered from pulmonary tuberculosis, and a few only had the well-known symptoms of antral empyema without any constitutional disturbances, but at operation tubercle bacilli were found in the discharge evacuated. In eight instances the presence of tubercle bacilli in the antral secretion was verified by microscopical examination.

Tuberculosis of the other accessory sinuses seems to be extremely rare, viz.: four cases of the frontal sinus and one of the ethmoidal and phenoidal sinus combined, which latter presented a most extended and destructive lesion of all the four sinuses.

The pathological conditions in sinus tuberculosis are very much the same as in nasal tuberculosis. Aside from the manifest lesions as empyema, exuberant granulations, cheesy deposits, caries, mentioned by the writers, Weinberger[8] made careful microscopical sections of the diseased antral mucous membrane. The epithelium was exfoliated in many places and a considerable small-celled infiltration had set in, penetrating the superficial as well as the deep layers of the mucosa, whilst the middle strata showed the fibrous structure of the connective tissue containing serous liquid and some leucocytes. The efferent glandular ducts and their lumina were enlarged, giving rise to cystic spaces, and giant cells were found in the infiltrated tissue. In his case, no tubercle bacilli could be found in ten sections made.

Although in many cases we have to be satisfied with the clinical statement of tuberculosis without the proof of the presence of tubercle bacilli, and a rigorous critic might feel inclined for this reason to eliminate one or the other case, I have ample reason to believe that all the reports have been made in good faith, and I personally have no doubt as to their true tubercular nature. All the references in this paper have been searched for and read by myself in their original publications, and I can vouch for their correctness. Tuberculosis of the maxillary sinus has been reported by Coakley[7], Demme[8], Gaudier[9], Gruenwald[10] (two cases), Keckwick[11], Neufield[12], Neumayer[13], Rethi[14] (two cases), Weinberger[8], Maydl[15], Avellis[16], Panse[17], Dmochowski[4], Killian[18], M. Schmidt[19], Zander[20] (two cases), and Wertheim[1]. In my opinion, more tubercular sinus cases do occur, and would be reported as such, if the contents of the sinus were regularly examined and the nature of the morbid process more carefully studied. Avellis quotes a number of authors relating cases of antral empyema similar to his own, in which empyema had previously been diagnosed, but a tubercular lesion due to extension of

caries and tubercle bacilli were found when he took charge of the child.

I shall not weary you with a narration of each individual case, and only refer to some clinical features in general and relate a few especially interesting histories. The presence of caries in 12 cases has already been mentioned; empyema, although not always specifically stated, can be assumed to have been present with exception of three cases. Extension of tuberculosis from a diseased alveolar process through dental fistula took place five times; through the canine fossa, once. Lupus of the nose was the cause in two patients.

Only three cases could be found, in which the tuberculous process was confined to the antrum of Highmore alone without manifestations in any other locality. Our member, Dr. Coakley, further, Gaudier and Keckwick, were fortunate enough not only to observe this extremely rare occurrence, but also to be able to report a cure at the time of their publication. Coakley's case presented the usual symptoms of antral empyema, but after the operation tubercle bacilli were found in the discharge. The lungs were examined by Dr. Le Fevre and Janeway one month later and found healthy.*

Gaudier's patient, a man of 40 years, suffered for several years from toothache and discharge in the left nostril. An exploratory puncture in the lower meatal wall revealed bacilli in the evacuated pus, and was followed by the radical operation through the canine fossa, and with appropriate treatment by a cure. Gaudier emphasizes the rarity of his case, in which tuberculosis was limited to the sinus, and only symptoms of empyema existed. Keckwick, a British dental surgeon, has the misfortune not only to have his name misspelled wherever quoted, and to appear in a standard throat work under a different name in the text from that in the literature appended, but also to have his publication everywhere referred to journals giving abstracts only, and never to the original with one exception. His patient, a woman of 30 years, had the usual symptoms of empyema of the sinus, which was opened through the socket of the second bicuspid and treated without improvement during twelve months. At last the pus was examined, tubercle bacilli found and the patient discharged cured after three months, but later lost sight of.

* It affords me great pleasure to learn from Dr. Coakley during the discussion following the reading of the paper, that he had seen the patient as late as one year ago, when he was in good health, without any local or general manifestation of tuberculosis.

Two more cases had a favorable issue. In the patient of Neufield, the disease began at the aveolar process, from which a fistula extended into the sinus, which was freely opened, curetted and a sequester removed. The communication between mouth and sinus remained, and was kept closed by a plate. Demme's patient was a nurse, who had attended to four children of non-tuberculous parents, but who, all four, died from primary intestinal tuberculosis. A few months after the death of the fourth child, the nurse consulted the doctor for a dental fistula existing several years, and a recent facial neuralgia. Demme found an old lupus at the septum, swelling of the face and a putrid secretion from the fistula of the right molar. Repeated scrapings and cleansings effected a cure. The infection of the children was caused by the habit of the nurse of tasting the food before giving it to the children.

The last case I shall relate is the severest I found on record, affecting all the four sinuses and having a rapid fatal issue. Panse saw a 16-year-old girl, who had been operated upon several times for nasal polypi. One month after the last operation she became suddenly blind. As disease of the frontal or sphenoidal sinus, involving the optic nerve, was suspected, they were opened and necrotic bone removed. Antisyphilitic treatment had no effect, the patient's condition grew worse, and after giant cells had been found an extensive operation was performed, consisting in splitting of the nose, removal of the nasal bones, the ethmoidal and sphenoidal bone, with exposure of the cerebral frontal lobe. Death took place after a short improvement. At post-mortem an old diseased focus was found in the apex of the right lung, tuberculosis of the cervical and bronchial glands, destruction of the optic nerve, circumscribed meningitis, and a tuberculous focus in the middle of the left parietal bone with cheesy pus.

Panse's case is the only one I could find in which tuberculosis of the ethmoidal and sphenoidal sinus occurred. It is also one of the four frontal sinus cases on record. The other three have been published by Frank and Kunze[21], Vohsen[22] and Schenke[23]. Frank and Kunze's patient had general tuberculosis, a swelling at the frontal sinus region, and at operation cheesy masses and a focus at the posterior sinus wall, extending to the dura, were found.

Vohsen's case had a fistula in the frontal region, leading to carious bone, and cheesy masses in the sinus. The ultimate issue is not stated in both cases. A typical case is reported by Schenke of a man, 18 years of age, who suffered from tuberculosis of the middle ear and of the cervical glands. When admitted to the hos-

pital, he had a swelling of the frontal region and a fistula of the mastoid process, extending posteriorly towards the cranial basis, and another one leading to the styloid process. A few days after the fistulous ducts had been scraped, the frontal sinus was operated, and tuberculous masses appeared immediately after incision of the skin. A fistula led to the left sinus, which was thoroughly curetted after complete removal of its anterior wall, and communication with the nose was established. Death took place twelve days after his admission. Post-mortem showed an abscess of the left mastoid process, extending to the cranial base, and the occipital foramen, into the interior of the cranial cavity, tuberculosis of the frontal sinus, but no perforation into the cranial cavity.

From all the data related, it is evident that the prognosis is as unfavorable as the treatment is unsatisfactory. If we analyze the cases carefully, we cannot say with any degree of certainty, if one of the few patients who appeared cured at the time of the publication, remained so definitely, as they were not observed sufficiently long after the operation. On the other hand, Panse's case teaches us, what rapid and destructive lesions can occur in accessory sinus tuberculosis.

The treatment is eminently surgical, and does not differ much from the proceedings generally adopted in severe cases of empyema of the sinuses. It has naturally to be more radical, as not only the soft parts, but also the diseased osseous tissue, have to be carefully and thoroughly removed, to eliminate if possible, all traces of the area involved. Supporting the general health, combatting the drain on the system and encouraging the patient's mental condition is our duty here as well as in many other serious diseases. I am not prepared to say, if specific treatment with tuberculin or its many derivatives would make any impression on the tuberculous process of the sinuses. No author mentioned it, and I have reason to doubt its efficacy in our affection, as their action is principally confined to the elimination of the tubercle bacilli, which were only found in a minority of the cases, whilst they do not influence directly the conditions due to the extension of the process. The same will hold good of the opsonin-tuberculin method, so much in vogue now in England. But in these desperate cases, I would not hesitate to use all the means at our command, and give a thorough trial to the specific treatment, to which I feel encouraged by the favorable results observed in uncomplicated nasal-tuberculosis.

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616 Madison Ave.

THE ACOUSTICS OF THE MOUTH AND THE RELATION OF THE INDIVIDUAL'S VOICE TO HEARING.*

BY D. BRADEN KYLE, A. M., M. D., PHILADELPHIA.

Much has been written from a physiologic standpoint concerning the speaking and singing voice. Such writers and investigators as Mueller, Helmholtz, Gradenigo, Hensen, Gruber, Bezold, Spear, Bonnier, Rossback, Merkel, Cohen, Makuen and Mackenzie have added much to our knowledge of the mechanism of phonation and hearing. Yet, after all, while a thorough knowledge of the normal condition is essential, the various *methods* used in training the voice are necessitated by pathologic alteration involving some portion of the speaking tract.

The *normal* condition would only require *training* in executing, while the *pathologic condition* causes *straining* in execution. The anatomy and physiology is, of course, important, yet if all the tissues and parts were normally formed there would be little difficulty in training the human voice, but in the majority of cases there is some deviation from the normal which interferes with the regular mechanism of the apparatus of phonation. It is with these irregularities or pathologic conditions that we purpose to deal. It is of the greatest importance that the teachers of elocution and music should thoroughly understand these irregularities and the very fact that *different* teachers *strongly* and *urgently* uphold different methods proves the existence of such irregularities. If the formation of the vocal apparatus was always normal there would be no necessity for methods. This explains why some methods are successful in some individuals and failures in others.

The method, then, should be adapted to the individual case and not the individual case to the method. The use of the facial muscles in a variation of tone is merely the power to expand the walls of the building, increase the volume and lessen the resistance of tone. The power to depress the tongue and throw it in any position desired voluntarily lowers the floor of the building, increases the space of outlet and enables the individual to have a larger compass of voice.

Voice production requires the use of a complicated mechanism, i. e., the so-called musical ear. Through conscious or unconscious

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cerebration there is called into action for voice production three anatomical factors—the lungs, the larynx and the resonance tube. The resonance tube includes all structure above the vocal cords, which includes the vestibule of the larynx. The pharynx, the tonsils, the posterior nares, the anterior nasal cavities, the accessory sinuses, especially the antrum of Highmore, and the mouth. It is this resonance tube that after tone is produced modifies or aids the fullness, the smoothness, the roundness, the power, the sweetness and beauty of the voice. It is in this tube that the sounds produced in the larynx are re-enforced and it is in this same resonating tube that these sounds may be distorted and converted into rasping, disagreeable tones.

Now, if the three essential anatomical factors, namely, the lungs, larynx and resonating tube, are proportionate then the tones coming from the larynx, being modified by the perfect resonator, unite and modify each other. If, however, there is any disproportion this resonator acts as a distorter of sounds. It is like a tenor string on a bass violin, it is a misfit. If all parts work harmoniously that individual is gifted with a natural voice and is a natural singer, requiring only careful education and practice to make perfect execution, but when such harmony does not exist, where diseased conditions or imperfectly developed parts in the voice apparatus do exist, it is then that the teacher of music must differentiate the condition, as one will require a *method* and the other merely *execution*.

Volume, tone and timbre are controlled by the size of the lungs, the larynx and the resonance tube. Their loss then may result from (1) disease of the lungs, bronchia or trachea; (2) the larynx, with its innervation, not only local lesions, but lesions elsewhere; (3) diseases of the pharynx and tonsils; (4) diseases of the nose, including septum and antrum.

Each voice has its individuality, in fact, our voice is a part of our individuality. Tone production, timbre or quality and resonance together with execution do not repeat themselves in the same manner in two individuals. This is especially marked in singers.

As to the question then of the acoustics of the mouth in its relation to the voice, the upper part of the resonating tube—the mouth, the tongue, the hard and soft palate, naso-pharynx, nostrils and accessory cavities bear the same relation to the voice as the building does to the speaker. The voice may be produced correctly, but its quality lost in faulty acoustics.

The building may be beautiful architecturally, but its acoustic properties poor. The decorator may improve the acoustics of the building, so may the laryngologist and rhinologist improve the acoustics of the mouth by correcting faulty conditions that interfere with perfect resonance. For example, the removal of enlarged tonsils, naso-pharyngeal growths, correction of nasal obstruction, etc. Again, in some cases, certain pathological conditions may improve the acoustics. One of our famous singers has abnormally large tonsils, in fact so large that when the tongue is protruded and the muscles of the larynx made tense, the tonsils project so as to meet in the median line; yet, when that individual sings, by depressing the tongue the tonsils fill into the lateral cavity of the pharynx, the patient having an unusually wide pharynx with concave walls. In this position, then, the tonsils offer no obstruction to sound in the resonating tube, while the removal of these tonsils would entirely alter the walls of the building and would also alter its acoustic properties.

An advantage of the mouth as a part of the resonating tube and its relation to acoustics is that the soft parts, namely, the cheeks and the tongue can be placed in various positions at will, so that the walls of the building can be expanded or contracted and the floor of the building elevated or depressed at the will of the individual.

The relation of the voice to hearing and the control of the voice by hearing presents an interesting subject for discussion and study. *Voice* is not *hearing;* we also have voice in the absence of hearing, yet *hearing* is really the *controlling* element in the production of voice. The relation of our own hearing to our individual voices is illustrated in our speaking and in singing. Our voice to us is what our ears indicate.

As to hearing, this necessitates two classifications, namely, *subjective* and *objective* hearing. By subjective hearing we mean the individual's subjective sense of sound-perception; in various lesions of the ear with the various noises heard by the patient, that is subjective; his sense of sound-perception of his own voice is subjective. However, in noises of the ear, which are usually only heard by the patient, we can form no comparison, because the observer cannot hear the noise. As to his own voice, we can compare his subjective sense of sound-perception with that of the observer. The individual's subjective sense of sound-perception is determined purely by external sounds. As to whether this is normal or ab-

normal he can easily determine by comparison with the external objective sense of sound-perception of others.

The training and cultivating of the voice under the guidance of a teacher, to be sure, is a great factor in the success of the individual as to his speaking or singing voice; however, one of the greatest difficulties the instructor often has is to convince the pupil that his voice is wrong. The pupil's own ears tell him that it is right. Many of you probably are aware that one of our greatest singers has one note which to that individual's ears is in perfect harmony, but which in reality is one-half tone flat.

A musical ear does not always mean a musical voice. Some individuals cannot sing or play and, as far as the music is concerned, could not tell "Yankee Doodle" from "Old Hundred;" yet the slightest discord in the human or orchestral tones will be detected instantly by such a person's hearing.

Again, certain individuals may have a musical voice as far as conversation or speaking is concerned, I say musical, meaning a pleasing tone, yet such individuals cannot sing and their ear will not tell them whether they are in chord or dischord. If, however, they are attempting to sing with others their ear will tell them if the voices do not harmonize, yet they cannot control it, as their ear does not seem to indicate to them that fineness or distinction of tone which permits of harmony.

The alteration in the individual's voice where the hearing has become defective is so marked as to become almost characteristic, although there are exceptions to this. I have seen a number of cases in which the patient was so deaf that he could not hear conversation even in the very loudest tones, yet there was practically no alteration in the voice, but this is, indeed, the exception.

The deaf and dumb may be taught to speak, yet the voice produced is unnatural and not altogether pleasing. The hearing, then, associated with the voice acts as a regulator; defective hearing may mean altered voice.

It often falls to the lot of the laryngologist to examine the throat of singers or would-be singers, and many times the instructor of music, having used all his methods and means to train a certain voice, finally appeals to you to determine what is the matter. The pupil is thoroughly convinced that he can sing, and to his ear he can sing, but, unfortunately to the nine hundred and ninety-nine listeners, his subjective sense of sound-perception is faulty. These cases are, indeed, pitiful. I do not mean that we do not have some cases who think they can sing in spite of their hearing and voice. These facts must be taken into consideration by the elocutionist and the teacher of music.

Another extremely interesting fact illustrating the relation of the voice and hearing is this; in the first place, few of us could accurately describe our voices so that the voice would be recognized by any one else. Frequently we hear individuals discuss voices, either speaking or singing, and while seven out of ten might agree that the voice was pleasing, melodious, soft and sympathetic, and possessed the many other attributes necessary in a successful singer, yet the remaining three of the ten would find fault, some rasping note, something not pleasing, showing that the objective sense of sound-perception varies greatly in individuals. Frequently individuals are criticised for their loud tone of voice. Individually they may be charming, but their loud tone of voice frequently attracts attention. Did it ever occur to you that this indvidual himself did not know that he was speaking in such a loud tone of voice? I know this is true, as I have interviewed several such persons, who had been taken to task for their loud tone of voice. When I would have them lower their voice to an ordinary pleasing conversational tone, they assured me that to them it sounded as though they were speaking scarcely above a whisper, showing that their ears for their own voice were not so sensitive as for outside sounds. In such individuals the subjective sense of sound-perception was decreased or below normal, while their objective sense was normal. On the other hand, some individuals who use a quiet, soft, low tone of voice, to their own ear it sounds as if they were speaking in a very loud tone of voice. In such individuals their subjective sense of sound-perception is extremely sensitive or exaggerated. Just as objective sense to sound may vary, so does the subjective sense vary.

The effect of drugs and stimulants also illustrates the peculiar relation of the individual's voice to hearing, in that certain drugs or stimulants may exaggerate the two conditions which I have just described. The man with the defective loud voice talks louder and the man with the defective low voice finally speaks so low that you can scarcely hear him.

The jerky, irregular voice of deaf person is another index or evidence of the peculiar relation of the voice and hearing. Without hearing, of course, there is no sound, but the voice is more than sound, and the voice to the individual or rather the individual's voice to himself, is exactly what his ear tells him it is, and if there is any loss of harmony between these two, then he will have defective voice, yet in response to all the tests of hearing he shows normal reaction.

A few days ago, in training a young man, whose voice had not changed at puberty, and finally by the use of the falsetto voice I had worked him down to a perfectly natural tone and after having him speak in that one for a few minutes his face assumed an anxious expression and he said, "Will that be my natural voice?" for to me it sounds frightfully strange and unnatural. His ear had not been trained to that sound.

Pathologic alterations of the structures of the naso-pharynx, whether due to local or systemic changes, will produce subjective and objective alterations in the sound-perceiving apparatus. The objective one can be determined by tests, while the subjective ones can only be described by the individual. The tinnitus associated with any such alteration, no matter what form it may assume, is heard only by the individual, except in rare pulsating cases, and it cannot be detected by the observer, although frequently subjective sounds are so intense that the individual thus afflicted can scarcely realize that the sounds cannot be heard by the observer.

The involvement of the apparatus of subjective sound-perception, especially of the inner portion or the orifice of the Eustachian tube, will give to the patient the sensation of altered voice, common in singers. To the audience their voice is in perfect form, while to their own ear the voice sounds muffled, in other words, the subjective perception is interfered with, while the voice is in perfect form. At the same time, this indvidual may not show any defective objective sound-perception. In objective sound-perception the external ear is the collector of sound, while the drum membrane and ossicles of the middle ear are the transmitters of sound; in subjective hearing, this condition is partially reversed, the Eustachian tube partially taking the place of the external ear.

Sound is what we hear; our perception of sound depends on whether it is subjective or objective and our description of sound will depend on the condition, subjective and objective, of our sound-perceiving apparatus. The deaf-mute has no conception of perception of either subjective or objective sounds.

Voice is sound, speech is voice in action; the impression made by voice and speech will depend entirely upon the condition of the sound-perceiving apparatus; to the individual himself it will be both subjective and objective, but to the listener it will be entirely objective. The impression given to either speaker or hearer, will depend upon the acoustics of the mouth and the condition of the subjective and objective hearing of the individual.

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SUBPERIOSTEAL SQUAMO-MASTOID ABSCESS, WITH SOME OBSERVATIONS ON THE ANATOMICAL DEVELOPMENT.*

BY SEYMOUR OPPENHEIMER, M. D., NEW YORK.

The development of a soft, more or less fluctuating mass over the region of the mastoid process of the temporal bone and accompanied with an outward projection of the auricle, is far more frequent under the age of three years than at any other period of life. Its not infrequent presence at this time resulting from the anatomical configuration of the temporal bone; in part from the extent of the primary suppuration in the tympanic cavity and often the factor of neglect plays a prominent role.

From an etiological aspect, various forms of subperiosteal pus collections over the mastoid process may be differentiated, and while it is desired here to consider that variety dependent upon an imperfect closure of the squamo-mastoid suture, yet it will be advisable to briefly mention the other factors concerned in the development of such pus collections. With but one exception, that of primary mastoid periostitis which must be considered as extremely unusual, subperiosteal abscesses over the region of the squamo-mastoid suture invariably result from the extension of pus collection in the tympanic cavity. Most frequently the route of the extension is by way of the antrum, the mastoid cells being involved to a greater or less degree, dependent upon the extent of the pathologic changes. In this form, the subperiosteal abscess represents the direction of the pus flow in the line of least resistance and also the accumulation of purulent material which is in excess of the cellular spaces represented by the tympanic cavity, antrum and pneumatic spaces of the mastoid process. In the young child, one almost invariably finds that the pus exit through the osseous tissue behind the auricle, is either directly through the fissure in its close relationship to the antrum, or in essential proximity to it, while in the individual at a later age whose mastoid process has fully developed, this is not so frequent as it is not at all uncommon to find a sinus at some other location over the external surface of the mastoid.

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In another variety of this form of mastoid abscess, the laying back of the soft tissues over the pus collection, will fail to disclose even on most minute investigation of the bony cortex, any microscopic evidence of sinuses or dehiscences in the bone, either in relation with this fissue or not, that will account for the presence of pus in this region, apparently separated from the middle ear and antrum by varying thicknesses of healthy osseous tissue. In such cases one will find, however, by microscopic examination of portions of bone removed at operation, that the infection has been transmitted from its primary focus in the tympanic cavity by direct paths via the blood and lymphatic channels; the minute vascular channels especially, perforating the bone from the interior to the exterior and thus intimately connecting the mucous lining of the spaces within, with this periosteum of the exterior of the mastoid process.

As a result of infection of the lining of the external auditory canal, either generalization or more especially when pus is produced in a localized form such as a furuncle, and extension of the infection posteriorly may take place with the development of a superficial abscess over the mastoid process and closely simulating that produced by the escape of pus through the squamo-mastoid suture. Such a condition, however, is not usually accompanied with middle ear suppuration, the abscess is more apt to involve the subcutaneous cellular tissues rather than the periostium and evacuation will disclose that the mastoid cortex is normal and free from fistula.

Without other sources of infection, it is also possible to have a subperiosteal mastoid abscess from primary infection either of the mastoid cells, or the periosteum covering the cortex, but such initial infections are rare and their etiological diagnosis always admits of considerable doubt, so that it will not be necessary to consider this variety of infection.

The mechanism of the extension of purulent material from the tympanic cavity to the exterior of the osseous mastoid process through the squamo-mastoid fissure, depends on many variable factors, of which the most important is the partial patency of the fissure and an increased resistance to the escape of pus in other directions, especially through the tympanic membrane. As regards the opening through the mastoid cortex, it seems to be a well established rule that the fistula is directly over or in very close relation with the antrum, as this portion of the osseous wall is thinner, often dehiscent in part and in the child, the class in which this form of abscess is most frequent, the covering here is often but barely thicker than a piece of paper.

As will be referred to later, the squamo-mastoid fissures undoubtedly bears a rather close relation in this respect, as in the young child the union between the two segments of bone here, is but partial and filled in with soft connective tissue, while in the child of later years and the adult, more or less incomplete osseous union along the entire course of the fissure exists in a considerable number of individuals. The breaking through of the pus at this point in such cases where the fissure still remains incompletely closed, presents an aspect of considerable practical interest, for at this point one finds the site of election for opening the antrum and mastoid cells not only in these cases, but in the general operation of eviscerating the mastoid process, so that in operating in such cases one can readily perceive the advantage of following the opening in this situation to the original source of the primary pus collection.

While a perforation of variable size may exist in the tympanic membrane either in acute, or chronic tympanic suppuration, yet the excessive amount of pus produced in some cases will be such that free and rapid exit is not afforded by this channel and a certain amount of purulent material will find an exit through this fissure, although objective examination will show a profuse discharge filling the external auditory canal. More frequently, however, the resistance in direction of the external canal is increased in acute cases by the thick tympanic membrane of the young child and the direction for easiest access for the pus to escape to the exterior, is by way of the patulous squamo-mastoid fissure. In chronic cases where the drum membrane is in greater or less part destroyed, the obstacle to the free flow of the secretion is generally some obstruction in the neighborhood of the margo tympanicus, such as granulation tissue, inspissated pus, debris, etc.

While, as before mentioned, both in children and adults, the direction of least resistance for the escape of the pus flow may be through the fissure, yet in a not infrequent portion of cases of subperiosteal mastoid abscess in very young children, the abscess may lie over this region and yet the purulent material has escaped from the tympanic cavity by dissecting away the periosteal lining at the inner end of the external auditory canal, at its superior and posterior borders, and thus producing a free exit of escape into the soft tissues behind the auricle. Under these circumstances, destruction of bone is frequent, while in cases where the pus finds its way externally through the squamo-mastoid fissure, necrosis to a greater or lesser degree is almost always found on operation.

When pus escapes externally through the squamo-mastoid fissure either from a simple middle ear suppuration, or one in which the mastoid cells are also involved, it does not necessarily follow that the external evidence of a subperiosteal abscess will be most marked over the location of the fissure, as in some instances, although rarely, it will show the greatest swelling above the mastoid process, as the pus will burrow upwards and collect in the parietal region.

The anatomical relations of the squamo-mastoid suture are such when it is incompletely closed, that it readily affords an almost direct communication between the middle ear and its adnexa, with the exterior of the mastoid cortex and thus provides a ready means of exit for any profuse discharge in the former region. In the very young child, the temporal bone is more or less loosely connected by various sutures which have not completely united by osseous tissue, but are held together by fibrous connective tissue, so that should any portion become infected, the further spread of the infection from its original source is thus greatly enhanced and purulent material thus formed, may readily pass from one part to another along the lines of these sutures.

This fissure forms the line of conjunction of the mastoid process with the external squamous plate of the temporal bone, so that in some specimens it forms a well defined gap between the early mastoid process and the horizontal portion of the squama. In the new born, the mastoid process is but a rudiment of the process in the adult, although at this early age its outlines are often well formed; even in the embryo the shape of the future mastoid process is fairly well performed and bears a definite relation to the groove under discussion. In the new born, this process is represented by a small tubercle posterior to the upper portion of the annulus tympanicus, so that during the first year, as the mastoid process becomes better developed and thus more clearly defined, it assumes a much lower position, and the squamo-mastoid suture bounding it anteriorly at the same time becomes less clearly defined in the majority of instances.

Inasmuch as the mastoid process is formed through the union of two portions of the temporal bone, the squamous and petrous portions each constituting a part, the squamous being in front and above the latter, it follows that the line of junction of these two parts is most conspicuous on the external surface of the mastoid process and thus constitutes this suture or fissure, which has such a prominent surgical interest in certain cases of subperiosteal mas-

toid abscess. In the majority of specimens examined, the suture extended from the anterior border of the mastoid process, a short distance above the tip in a direction upwards and backwards, and usually followed a line more or less parallel to the posterior border of this process.

In a few cases it is very apparent that the mastoid process is developed at the inferior anterior part of this fissure and as far as the temporal bone of a child a few months old is concerned, as this fissure is most important pathologically in the child of an early age, it will be found in quite a number of instances, that the outer surface of the mastoid shows this fissure as a bony deficiency at its anterior and superior edge. Although in some cases even at this early age the fissure is not at all well marked and one can recognize its location only by a series of irregular semi-openings at this location, varying in size from two to three millimeters in diameter, thus showing that the line of osseous union between the squamous portion and outer mastoid wall was well advanced. In such cases as these, the development of a subperiostial abscess by this route being almost an impossibility, the mastoid cortex by preference being perforated in other and less resistant locations.

In the new born, therefore, the squamo-mastoid fissure can generally be recognized as an irregular depression lying between the anterior surface of the tuberculum mastoideum and that part of the posterior portion of the pars squamosa which forms the external wall of the so-called mastoid antrum, although it is always well to bear in mind that this latter cavity is anatomically a part of the tympanum and not of the mastoid process. As the child grows older and about the end of the first year, the osseous union of the temporal bone in its various parts begins to be fairly well completed in the average cases and thus union taking place, this suture becomes more or less obliterated, but often leaving behind some well marked traces of the former separation in this location. By the end of the first or second years, the suture in the majority of individuals has entirely disappeared, although, as before stated, in a small number it may persist even in the adult, showing as a jagged, somewhat deep, irregular furrow at the line of union of these portions of the temporal bone.

Following along the lines of development of the temporal bone, it will be found that some portions unite at a much earlier period than others and in relation to the anatomical configuration of this fissure, it will often be found that the antero-superior and the pos-

terior parts of the tympanic ring together with the inferior portions of the posterior process of the horizontal portion of the squamosa, unite by osseous union at a much earlier period than the other portions of the bone in this location and also of the neighboring osseous tissue, so that while in some instances the peripheries of the squamo-mastoid fissure will be firmly united, the central portion will remain more or less dehiscent, being filled only by soft connective tissue, the other portions of the fissure being more or less completely obliterated by the firm osseous union.

Returning again from the child to the adult type, it has been found that the squamo-mastoid fissure is quite extensively opened in about three per cent of all temporal bones examined and the usual specimen will show it as a more or less complete fissure running in an irregular zigzag manner from a position posterior and superior, in a direction inferiorly and anteriorly. Or, in other specimens, it will be found to consist of a series of small, irregular clefts or foramina arranged along the line of location of the fissure. While again in another class of temporal bones, these partial openings are invisible from their filling up by osseous tissue and the position of the fissure can only be located by an irregular rough line separating the smooth antero-superior portion of the pars squamosa, from the rough and irregular true mastoid portion of the temporal bone lying posteriorly and inferiorly. So that irrespective of whatever variety of temporal bone exists as regards this suture, it will be found in the great majority that while it plays no part in the formation of a subperiostial mastoid abscess, yet it is recognizable in the adult although but a trace of it remaining.

From the studies made by Kirschner on the skulls of thirty children and three hundred adults, he found the squamo-mastoid suture existing either perfectly or partially in the majority of cases and on both sides of the head. If it was found to be most marked on one side, then this occurred most frequently on the left, while as regards its presence as related to sex and age as a factor, no appreciable difference was ascertainable. Although he found it present in the skull of an individual eighty-three years old. It was also found as a result of these important studies, that when the squamo-mastoid fissure was well marked, the thickness of the mastoid process from without inwards, was less in proportion to its breadth and height.

As regards the relation of the soft tissues concerned in the development of a subperiostial pus collection and this fissure, it will be found that in such cases where this condition develops from an

original middle ear suppuration, that the infection does not spread directly through an open fissure, but that the suture is irregularly closed with connective tissue and periostium. The infection of this tissue necessarily preceeding the development of pus under the dermal surface covering the mastoid process. These soft tissues containing blood vessels form a continuous line of relationship between the tympanic cavity and the osseous exterior, as they practically represent both from an anatomical and surgical aspect, the continuation of the lining of the tympanic cavity and mastoid cells with the periostial covering of the surface of the latter.

The development of this form of abscess in relation to the pathological changes in the mastoid and middle ear, presents several features of marked importance, as when developing in connection with marked mastoiditis, one usually finds that the interior of the mastoid process is occupied by one or more large sequestra in the chronic cases, although even in instances when the aural affection has been of but comparatively short duration, even lasting but a few weeks, a large portion of the bony structure may be entirely separated from the surrounding tissue. This condition of extensive necrosis and caries, is mostly apt to follow diphtheria and scarlet fever with secondary aural infection. While in cases where these acute infectious diseases are not directly concerned in the etiology of the aural suppuration, it will almost invariably be found that such extensive osseous destruction occurs in cachectic individuals, such as children with a tuberculous taint, or poorly nourished, or subsequent to long continued illness of various types.

Not only in such cases does the destruction involve the common seat of predilection, that surrounding the antrum, but the squamous portion of the temporal bone undergoes partial disintegration especially in the neighborhood of the squamo-mastoid fissure, so that this portion of the bone may be converted into a deep and wide opening through which pus escapes to the exterior. While subperiostial squamo-mastoid abscess is most frequently found in the so-called strumous type of child, this cause is most frequent from the third to the seventh and eighth years of life, as in the infant it may follow any form of suppurative otitis media, even in an otherwise healthy individual. In the latter type, the brunt of the primary infection is borne by the tympanic cavity, while in the tubercular or strumous individual, the pathologic changes are more frequently of greater severity in the antrum than in the former cavity, as a result, I believe, in such cases of the drainage being obstructed at this

point; the tympanic secretion being readily drained off through the external auditory canal.

Undoubtedly this form of abscess occurs most frequently in the very young child as a complication, or termination of acute suppurative middle ear disease, and while in a not inconsiderable number of instances the infection extends by way of the squamo-mastoid fissure, yet in other cases which must be differentiated, it may be secondary to an otitis externa which has followed or accompanied the tympanic suppuration and as a later sequence infection of the mastoid periosteum takes place with the breaking down of this tissue and the development of a subperiosteal pus collection, either with or without the escape of pus through this fissure.

When the suppurative process involves the lining membrane of the mastoid cells, the osseous tissue itself in a considerable number of cases may during the entire course of the affection remain perfectly healthy, the pus escaping through this suture, so that at no time is it confined in the interior of the temporal bone. In any of these cases, however, when an external periostitis develops and the pent up pus in the larger cavities of the bone is allowed to quickly reach the surface, the relief of the pressure obtained by the pus escaping under the soft tissues alters the pathologic changes going on in the cavities of the interior, as it practically amounts to a temporary evacuation of pus from its original confined site to another location where externally it is resisted by soft tissues instead of having on all sides bony walls, so that at this time in the course of such an infection, distinct relief to all the symptoms should such be present, is temporarily obtained.

In chronic suppurative otitis media in children, where treatment has been but desultory or the case has been entirely neglected, some portion of the mastoid cortex is sooner or later eroded and finally perforated. Whether the pus escapes in this manner or by way of the suture under discussion, the further pathological changes are identical in all instances, as an effusion then takes place beneath the mastoid periosteum at the point where the morbid process is most active; then the periosteum is dissected loose from the underlying bone by the inflammatory exudation and at a still later stage the pus collects in greater or lesser amounts under the periosteum, where it may remain more or less localized to a limited area, or even penetrate it and become infiltrated into the cellular tissues beneath the skin.

The structural conformation of the mastoid interior in relation to its anatomical development, bears a not inconsiderable part in determining the direction in which the pus will escape, as in the pneumatic type of mastoid where the cells are of considerable size and the cortex is thin, the pus is more apt to escape externally by perforating the cortex than in those individuals with sclerotic or diploetic mastoids. While in that form of subperiosteal abscess resulting from the escape of pus through the squamo-mastoid suture, the particular type of mastoid is in itself of little moment, as the opening of this fissure is sufficient to allow at least the partial escape of secretion, without producing a fistula in various portions of the temporal bone either internally or externally. But in spite of this, in children where the mastoid has sufficiently developed so as to assume the adult conformation, it is often found on account of structural peculiarities in the bone, that even with a free escape of pus under the cutaneous covering of the mastoid process, there is a considerable degree of necrosis, usually accompanied with the formation of a large sequestrum which is frequently surrounded by granulation tissue and pus.

A most important question concerning these cases is whether any danger of intracranial infection remains after the pus has forced its way beneath the skin covering of the mastoid process. That such a danger does exist cannot be denied, as the amount of pus escaping from the middle ear and mastoid cells under such circumstances, is always limited and in acute cases especially, the natural thickness of the membrana tympani in the child, still retaining its integrity in many cases, offers an added barrier in preventing the escape of pus through the external auditory canal. When the subperiosteal abscess is present, therefore, and the subjective symptoms have subsided, the danger of intracranial infection has not been eliminated, as the safety of the individual practically is dependent only on the small passageway presented by the suture and in addition to the danger of an area of caries developing in relation to the cranial cavity in children infection is also liable to take place by way of other incompletely closed sutures, or it may even result from pathologic changes taking place in the squamous plate. In very young children, however, the danger of such serious complications is greatly minimized on account of the structure of the temporal bone at this time, as the inner mastoid walls are thick and not only relatively but actually more resistant, while the cortex is the reverse; this being directly opposite to the condition as it occurs in adults.

Both in the child and the adult, the presence of a subperiosteal abscess is readily recognized by the swelling over the mastoid process, and if the pus accumulation has existed for any length of time, the tissues are red and oedematous with more or less accompanying pain. Pressure upon this form of abscess will always cause the pus to flow from the external auditory canal if a perforation exists in the membrana tympani and in a not inconsiderable number of cases especially in children, symptoms of general sepsis develop at an early period. It should always be remembered, however, that in some instances the pus may escape through the fissure without pain or other symptoms, so that the first indication that the condition exists is the discovery that the aurical is projecting forward and that there is a swelling over the mastoid process.

Finally, as to the area covered by the abscess. This will depend to a great extent upon the attachment of the periosteum to the bone and while as a rule the periosteum is more loosely attached in an upward direction over the squamous portion of the temporal bone, than inferiorly towards the tip of the mastoid, the pus usually dissects up the soft tissues in this direction at first, so that as a rule one finds the bulk of the abscess situated above and behind the auricle. And as the periosteum is firmly attached to the osseous tissue at the junction of the various sutures, its limits are usually sharply defined by these anatomical boundaries.

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FOUR MASTOID CASES.*

BY NORVAL H. PIERCE, M.D., CHICAGO.

CASE 1. *Operation for Chronic Suppurative Otitis Media without Removal of Membrana Tympani or Ossicles.* Man, aged 20, had measles at 7, following which both ears discharged, resulting in chronic suppuration. The right ear has been dry for a number of years. The left ear continued to discharge, profusely at times, and there has been pain over the mastoid region. The discharge was purulent in character and came from a small perforation in Schrapnell's membrane, the pars tensa being intact. He could not hear a whisper and a conversational voice only at two feet in the left ear. The right ear is also affected. On December 26th last, the mastoid antrum was opened and the external auditory canal taken away down to the annulus. The aditus ad antrum and surrounding cells were found filled with a cholesteatomatous mass of tissue intermixed with pus. When this was cleaned out up to the healthy bone, a cavity the size of a filbert remained. The tympanic membrane and contents of the cavum were not disturbed. A very careful examination disclosed no caries of the ossicles. A reverse Stacke flap was made from the external auditory canal and turned into the cavity; that is to say, as the Stacke flap covers the floor of the cavity, left after a radical operation, this that I made covered the roof and was packed in position. The posterior incision was closed; drainage was carried into the external auditory canal, and a wet fifty per cent. alcohol dressing put on. The posterior incision healed, as you see, by primary union. The cavum is now dry, likewise the antrum. There still remains a perforation in Shrapnell's membrane. The man can hear eight feet for voice, and two for a whisper in the left ear.

This operation is especially indicated in cases where there is only perforation of Shrapnell's membrane and the pars tensa is intact, or where there is only a small peripheral perforation in the pars tensa. Where there is extensive destruction of the tympanic membrane, and the ossicles are necrotic or bound down by adhesions, there is little gained in stopping short of a complete radical operation. In certain cases it will be found impossible to perform this operation, especially in those in which the chronic discharge is kept

* Read before the Chicago Laryngological and Otological Society, February 19, 1907.

up, not be a large cavity in the mastoid process, but by a fistulous tract, or where the antrum and aditus are reduced in size by plastic inflammation, or even obliterated, we must, after our attempts at reaching the antrum have proven unsuccessful, resort to the Stacke procedure of following up from the middle ear. There was two methods by which it may be performed. *First,* in the manner illustrated by the present case; *second,* by taking away the external wall of the epitympanic space also, yet leaving a rim of bone to hold the tympanic membrane. Attention has been drawn to this operation by a recent article written by Heath, but it is not a new procedure by any means. The results, so far as hearing is concerned, are more successful than those obtained by the complete radical operation, but it is only suited to selected cases.

CASE 2. *Acute Otitis Media, Mastoiditis, Abscess of the Neck.* Adult woman, admitted to the Policlinic with acute otitis media and mastoid involvement, with swelling at the tip, and a temperature of 102°.

January 13, 1906, the mastoid process was taken away and the anetrior zygomatic cells thoroughly cleaned out. Two days afterwards a large abscess apepared in the neck, accompanied by a rise of temperature to 103°. It rapidly invaded the deep tissues of the neck, and was opened just an inch above the sternum at the point marked by the present scar. Two weeks later the swelling developed on the side of the face. A drainage tube was inserted below the jaw at the point marked by the second scar. The patient was markedly septic; slight facial paralysis gradually came on, together with torticollis, which drew the head well to one side. You see now a woman in perfect health, with full movements of the facial muscles, and no torticollis. Massage of the sterno-cleido-mastoid muscles on the affected side will hasten the disappearance of these conditions which result from suppurative processes in the muscles themselves.

CASE 3. *Facial Paralysis following Cholesteatonia with Mastoid Operation. Partial Re-establishment of Function after Three Years.* This little girl was operated on when five and a half years old, for an enormous cholesteatoma in the left ear. Complete facial paralysis followed immediately after the operation and existed for four years. At the time of the operation I was convinced that the sequestrum which had formed in the deeper portions included the facial nerve. Three years ago the facial muscles began to show reaction and, as you see now, the patient can use the muscles quite

well, closing the eye perfectly. This case illustrates one of two things, either that the nerve is capable of regeneration after a very long time, or that nervous impulses may be carried to the facial muscles through channels outside the trunk of the facial, most probably through the hypoglossal.

In Seppy's Anatomy there is an illustration portraying a branch which goes from the peripheral portion of the facial to the hypoglossal. That this anastomotic action may take place is proven by a case reported by Bezold in which the sequestrum taken from the ear enclosed the facial canal.

CASE 4. *Acute Mastoiditis, Operation with Repeated Sloughing of Wound. Hysteria?* A girl, 16 years of age, was sent to me from Las Vegas, New Mexico. One year ago she had some work done on her tonsils. Three months afterwards she complained of pain in the right ear and over the mastoid region. On inspection, the membrane was found congested. Paracentesis was performed without result. Her condition continued for about a month, when the patient was placed in charge of another doctor. During the first part of July the temperature arose to 100°, with infiltration and tenderness over the mastoid. Her physician did a simple mastoid operation, finding softened bone with some pus. The wound healed kindly, and the patient did well, until September, when the mastoid again became infiltrated and tender. Another opening was made, and an immense amount of semi-necrotic bone, with a small amount of pus, was removed. The temperature then was 100.5°. Patient did well for two or three days, when she complained of pain and became unconscious at each dressing, but occasionally between times remaining for a few minutes, once for eleven hours, unconscious. The return of consciousness was marked by a jerk. After the last operation, while the wound seemed to fill in, it became gangrenous and sloughed. In October she was again operated on, and only granulation tissue was found. The wound healed kindly, but when practically closed, without any warning, the wound sloughed out and became gangrenous. It resisted all treatment; the bone became exposed, and unconscious states have continued up to the present time. There is now a punched-out hole behind the ear. The space is white, with a sprinkling of blackish spots. The white base is made up of a layer of carious bone. If this is scratched, bleeding of the vessels beneath takes place. About the edges of the wound is a slate-colored slough, with a narrow rim of periosteum, the neighboring soft tissues being slightly involved. The skin is not in-

filtrated, but is macerated from the discharge issuing from the wound. There is no active suppuration, and there is marked anesthesia of the scar and surrounding tissue. I have examined the patient carefully for the stigmata of hysteria and find the classical symptoms all present. She has complained at times of blindness in the right eye, coincident with the exacerbations occurring in the mastoid wound. Syphilis, tuberculosis, carcinoma, may, I believe, be excluded in this case. As the wound began to change in character and showed signs of rapid healing, I have not taken away any of the soft tissues for microscopic examination. I believe that we have here a process which is conected in some way with the hysterical state. Whether it has been produced by the patient's efforts to arouse sympathy by the introduction of substances beneath the dressing or not, I am unable to say, but the fact remains that under suggestion the wound is rapidly healing.

725—31 Washington St.

The Use of Suction in Middle Ear Disease. SONDERMANN. *Arch. f. Ohrenh.*, Dec. 1904.

Suction is applied to the middle ear by means of an apparatus devised by the author. It consists of a mask which fits on the side of the head, around the auricle, and which is connected with a rubber bulb. The air in the mask is rarefied and the secretions contained in the tympanum are drawn out by suction. The apparatus is applied by the patient himself after each irrigation. If the patient swallows while the apparatus is in place, air enters through the Eustachian tube, and a sort of Pollitzerization is performed. The author claims that the apparatus is a useful addition to treatment.

YANKAUER.

A CASE OF FOREIGN BODY IN THE LARYNX FOR TWO YEARS. THYROTOMY. RECOVERY.*

BY SYLVAN ROSENHEIM, A. B., M. D., BALTIMORE.

This case is of especial interest for two reasons, first the toleration of the larynx, the foreign body remaining there for two years, and secondly the almost perfect result following the operation. From the moment the patient swallowed the foreign body, a button hook from a shoe, until the operation, he was unable to speak above a whisper. He now speaks very distinctly, the voice is, however, slightly husky.

The patient, a boy aged seven years, was seen first by the writer at the Johns Hopkins Hospital Dispensary in June, 1904.

COMPLAINT. Difficulty in breathing. Choking spells. Inability to speak above a whisper.

FAMILY HISTORY and PAST HISTORY unimportant.

PRESENT ILLNESS. Two years ago the patient swallowed the hook from a shoe. Since that time he has not been able to talk above a whisper. He was brought to this dispensary, the mother states, a number of times, but nothing was found. For the last six months he has had attacks of dyspnea and choking at night, which often last for five minutes. He is not bothered in the daytime. During these attacks he gets blue in the face and sometimes spits blood. He breathes very heavily now and with considerable effort. At night he breathes through his mouth.

PHYSICAL EXAMINATION. There is marked stridor on both inspiration and expiration. The tonsils are enlarged and adherent to the anterior pillars. Adenoid tissue in the naso-pharynx enlarged.

Larynx. The epiglottis, arytenoid bodies and aryepiglottic folds are perfectly normal. The rest of the larynx is filled up by a large irregular swelling, which involves principally the place of the right true and false vocal cord. It is of a reddish hue, the surface has a granular appearance. At the first examination it was noted that this was probably a mass of granulation tissue surrounding the foreign body. The left ventricular band is also swollen, concealing the true cord. It also has an irregular granular appearance. The ap-

* Read before the Johns Hopkins Medical Society, February 4, 1907.

pended diagram gives an approximate idea of the laryngeal appearance.

The patient was admitted to the Hebrew hospital and operation performed May 24th by Dr. R. H. Follis and the writer. On admission his temperature was 99.8°, pulse 100, respiration 26. He was slightly cyanotic and there was some stridor on respiration. He was unable to speak above a whisper.

Examination of the chest showed indentation of the infraclavicular fossa and the lower part of the sternum. Rachitic nodules are present on the ribs. Otherwise the chest is normal.

OPERATION. Low tracheotomy; Thyrotomy, Removal of Foreign Body and Granulation Tissue about it. Chloroform Anaesthesia.

After the performance of the tracheotomy, the skin incision was carried up to the level of the hyoid bone. The superficial tissues

Fig. 1. Appearance of Larynx before Operation. x Narrowed Glottis.

were next cut through down to the thyroid cartilage which was severed with the bistoury in the mid line. The foreign body immediately appeared in the opening. The button hook was black, eroded in places, and had the offensive odor of necrosis observed in a decaying tooth. A mass of grayish white tissue was removed from the larynx with scissors, mostly from the right side in the region of the ventricle.

The thyroid cartilage was then sutured with silver wire, the muscles brought together with silk sutures and the skin united by interrupted silk sutures.

The day following the operation the patient's temperature rose to 100.8°, and on the second day to 101.4°, following which there was a gradual decline to normal on the fifth day following the operation. Convalescence was interrupted only by the formation of

stitch abscesses and the healing of the wound by granulation. The tracheotomy tube was removed at the end of the first week. He was discharged from the hospital June 16th, 23 days following admission, with the wound almost closed. He then breathed perfectly freely and was able to speak in a loud whisper.

After a number of the silk sutures were discharged from the wound, it healed. The voice and general health of the patient have steadily improved. The tonsils and adenoids were removed some months after the thyrotomy operation.

Examples of foreign bodies fixed for any length of time in the larynx are very infrequent. They are usually expelled or drop down the trachea. Sometimes they cause immediate asphyxia. A few cases of retained foreign bodies are reported in the monographs of Poulet, Schaeffer and Schroetter. Moritz Schmidt mentions one

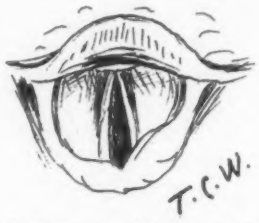

Fig. 2. Appearance of Larynx at Present.

case in which a piece of wood 1 cm. long remained in a man's larynx for eight years. It produced chronic hoarseness and was expelled spontaneously. Desault had a case in which a cherry pit remained for two years in the ventricle of the larynx. Watson reported a case of a gold coin remaining for years in the larynx without producing severe symptoms. Among 16 cases of laryngeal foreign body observed in von Schroetter's clinic up to the year 1901, the longest sojourn of any was three and one-half months. An interesting case of foreign body removed from the larynx after thyrotomy is reported by Morell Mackenzie. In this case the foreign body, a toy engine, passed into the boy's larynx during sleep. Tracheotomy was done and some months later the case was seen by Dr. Samuel Johnson, Dr. Mackenzie's assistant, who removed it after performing a thyrotomy. In this case the voice remained hoarse.

The fate of the foreign body lodging in the larynx depends upon its size, disposition, duration, and lastly upon the toleration of the patient. The initial attack of suffocation followed by coughing may result in its immedate expulsion. Or after staying a variable length of time it may be expelled. It may cause immediate fatal asphyxia. This occurs especially in cases where large particles of food lodge in the larynx, in old people or when there is anaesthesia of the larynx.

Schaeffer reports a case in which a chicken bone 3x1 cm. remained on the posterior laryngeal wall for 6 months, causing only a slight thickening of the parts. Usually, however, suppuration takes place. An ulcer forms, which may be superficial or deep, covered by a yellowish or diptheritic exudate. Finally, granulation tissue forms, enclosing the body and holding it fast. In some cases the foreign body works its way externally, forming an abscess in the neck. Large vessels are sometimes eroded, causing fatal hemorrhage. Schaeffer mentions one case of cyst formation caused by a foreign body.

The diagnosis of a foreign body in the larynx is usually indicated by the anamnesis. The hoarseness, difficulty in swallowing and dyspnea point to it. If it is a sharp object, palpation externally will help to locate it. The laryngoscopic examination usually shows its position. However, if it is very small and lies in the ventricle of the larynx, it may not be visible. Or, if it has lain there for some time and has become surrounded by granulation tissue, its location cannot be made out. In such a case the Roentgen ray might be of value. In children and very nervous individuals laryngoscopic examination may be impossible. In such, direct inspection with the bronschoscope under chloroform anaesthesia should be tried or an exploratory thyrotomy at once performed.

The treatment of foreign bodies depends a great deal upon the facilities at hand and the expertness of the physician who treats the case. If the physician is at hand when the accident occurs he should invert the body of the patient, thus allowing the force of gravity to assist the coughing efforts of the body. An emetic may also be tried. As soon as possible the body should be located in one of the ways which have been mentioned and removal attempted, first under the guidance of the laryngoscope, if this appears feasible. Much has been accomplished recently with the aid of the bronchoscope in the removal of foreign bodies here and lower down in the respiratory tract.

In very young children and in cases of imbedded foreign bodies like the case presented to-night, thyrotomy would be the operation of choice. The objections advanced against this operation have been the fear of loss of voice and the mortality of the operation. However, if the incision through the tyroid cartilage is made in the mid line, thus avoiding the vocal cords, the results as regards the voice are very good, even in cases where a part or the whole of a vocal cord is removed. In fifteen cases in which Chevalier Jackson performed thyrotomy for intrinsic cancer of the larynx there was not a death as a result of the operation. He places his patients in the Trendelenburg-Rose position, uses chloroform anaesthesia and illuminates the field of operation with an electric head light.

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522 N. Charles St.

CASE REPORTS. (a) EPITHELIOMA OF THE LARYNX: TOTAL LARYNGECTOMY INCLUDING THE REMOVAL OF PART OF THE TRACHEA. DEATH FROM PNEUMONIA ON THE THIRTEENTH DAY. (b) SARCOMA OF THE PHARYNX IN A CHILD OF EIGHT YEARS, WITH AUTOPSY FINDINGS AND MICROSCOPICAL REPORT.*

BY CLEMENT F. THEISEN, M. D., ALBANY, N. Y.

CASE A. This case is reported, because it emphasizes the point brought out by Delavan in a paper read at a meeting of this association (Recent advances in the treatment of malignant disease of the larynx, 1904), that early radical operation offers the only reliable prospect of cure in cancer of the larynx. It brings out another point so often raised by Mackenzie in discussions upon this subject, that microscopical diagnosis of cancer of the larynx is often difficult, and that the laryngologist may be misled by his pathologist, and valuable time lost.

There is no doubt, however, that the fault is often the laryngologists, for not cutting deeply enough into the growth when he removes a piece for microscopical diagnosis. It is well known that a laryngeal growth may not show malignancy on the surface, and still be malignant. This question has been so thoroughly discussed at meetings of this association that I will not go into it any further. I will say, however, that in my own case, it would have been better, and the patient would have had a better chance, if the radical operation had been performed just as soon as the naked eye diagnosis of cancer was made.

I *did* make that diagnosis, but when several pieces were removed for microscopical examination, and the report came back that the growth was not malignant, I felt doubtful of my diagnosis, and so lost much valuable time.

I have no doubt at all that the removal of pieces of the growth for examination, was probably responsible for the very rapid extension of the disease subsequently.

Mr. F. M., aged 57 years, was referred to me by his physician (Dr. Barnes, of Troy,), with the history, that for several months he

* Read before the Twenty-ninth Annual Congress of the American Laryngological Association, Washington, D.C., May 7, 8 and 9, 1907.

had been hoarse, but that his general condition had been very good. I first saw him last September. On examination, the nose, naso-pharynx, and pharynx, showed practically normal conditions. On laryngeal examination, however, a rather flat, somewhat nodular, firm growth, involving about two-thirds of the left vocal cord, was seen. This presented very much the appearance of multiple, small, papillomatous excrescenses. The left ventricular band was somewhat reddened and thickened, as was also the mucous membrane in the left arytenoid region. The right cord was slightly reddened, but was smooth and otherwise normal.

On October 3rd, several small pieces of the growth were removed with cutting forceps, and sent to the laboratory for microscopical examination.

The report came back that the growth was not malignant, and was probably of an inflammatory character. My original clinical diagnosis was carcinoma, but thinking that I must be mistaken, and after talking the matter over with his physician, we decided to use palliative measures for a time. There was no involvement of the cervical lymph nodes so far as could be determined.

The patient was under my observation for a number of weeks after this and improved somewhat. I then did not see him until January 14th of this year. He had been having considerable dyspnoea, and was breathing with some difficulty when he came into my office. The growth had extended very much in the interval, involving the whole left cord, extending below the cords, and the right cord also showed evidences of a new growth. The condition now was so clearly malignant and the dyspnoea was so great, that I performed tracheotomy, using equal parts of a sterile solution of 1% cocaine and 1-10,000 adrenalin.

This solution I have used in a number of tracheotomies in adults, and it has given uniformly good satisfaction.

I told him that a radical operation still offered him some chance, but it was not until three weeks after the preliminary tracheotomy that he would consent to this. A total laryngectomy was performed in the Samaritan Hospital in Troy, and for a week the patient got on very well.

The method that has been advocated by Gluck, working from above downward, was followed. Because the growth had extended into the upper part of the trachea, the trachea was removed with the larynx for some distance below the site of the preliminary

tracheotomy, the severed trachea being stitched to the skin. Chloroform was administered through the tracheotomy tube during the operation.

The patient was given no nourishment by the mouth for several days after the operation and for a week got along very well. He then developed a pneumonia and died on the thirteenth day after the operation.

The operation was performed in conjunction with Dr. Harvie, of Troy, Attending Surgeon to the hospital, and Dr. Barnes.

The pathological report is as follows:

Samaritan Hospital, Feb. 9, 1907.

Gross description.—The specimen consists of a larynx. On its anterior surface just below the thyroid cartilage, a small portion of skin is attached, in the center of which is a sinus communicating with the trachea below the larynx, the result of a tracheotomy. The walls of the sinus are lined with granulation tissue. The inner opening into the trachea is about 1 cm. in diameter, and much larger than the surface opening. By looking into the larynx from above, a vegetative growth is found on the vocal cords, particularly on the left side and the cords seem partially fixed. After sectioning the larynx posteriorly in the median line, the left side is found to be almost completely covered with a whitish, minutely nodular, fungoid growth, of firm consistency. The growth extends to the right side also, but involves only the anterior third of the right vocal cord. The central portion of the growth is softened, and somewhat degenerated, the advancing edges elevated and hard. No regionary metastases are found.

Anatomical diagnosis.—Epithelioma of the larynx.

Microscopic appearance.—The surface epithelium at the margin of the growth is of normal appearance, its transition into the malignant growth can be definitely demonstrated in the sections. The growth itself is entirely of epithelial origin, and consists of irregular columns or spheres of epithelial cells, growing into the underlying tissue in all directions. The cells are cuboidal or round, of large size with a pale-staining nucleus, and many mitotic figures can be seen. The marginal cells are more closely packed, and resemble in their arrangement the stratum Malpighii in the epidermis. The growth shows a tendency to rapid degeneration in the centres of the columns and spheres, for frequently the cells are replaced by granu-

lar detritus. The interstitial connective tissue is thickly infiltrated with small mononuclear leucocytes and plasma cells, and in some areas there is a proliferation of the small capillaries. The hyperplasia of the connective tissue is definite, and has the appearance in places of granulation tissue. No metastases could be found.

Revised diagnosis.—Epithelioma of the larynx.

H. W. CAREY.

Gluck has had undoubtedly by far the largest experience in total laryngectomy for malignant disease of the larynx, and has had the most successful record, considering the large number of operations he has performed.

Recently Chevalier Jackson (*British Medical Journal*, November 24, 1906,), has reported eight total laryngectomies, with no operative mortality. One of his patients lived seven years after the operation, and one case lived three years without recurrence, dying of cerebral hemorrhage. One patient lived eight months, dying of alcoholism. Of the remaining five, three recurred within a year, one apparent cure was lost sight of, and one was too recent to record.

Preliminary tracheotomy seems to be advisable, although Keen, without preliminary tracheotomy, severs the trachea and stitches it to the skin as the first step, after exposing the larynx and trachea. This method of stitching the trachea to the skin was also successfully employed by Solis-Cohen in his well known case.

In conclusion, the writer would say that in his case the delay occasioned by the favorable report of the pathologist was certainly injurious to the patient. An early thyrotomy might have been performed, with a much better chance for the patient. In such doubtful cases, it would seem best to depend upon the naked eye diagnosis of cancer and go ahead with the operation immediately.

The removal of pieces of the growth for microscopical examination is not always wise, because if only small pieces are removed from the surface of the growth, the examination may not show malignancy.

CASE B. A search of the literature of the past twelve years, revealed the fact that sarcoma of the pharynx in young children is rare, so that the writer considered the following case worth placing on record.

A. S., a girl aged 8 years, was referred to the writer on January 11th of this year, with the history that for several months there had

been an increasing difficulty in breathing. The child's parents are living and well, and there are five other perfectly healthy children in the family. The child's great grandfather is said to have died of cancer of the throat. The child had lost weight rapidly and was in bad general condition.

Examination of the throat showed the presence of a large mass, including the soft palate, and pushing it forward. The growth extended downward almost to the epiglottis, and apparently into the naso-pharynx, although this could not be examined, as the finger could not be carried around and back of the growth. There was a constant discharge of an offensive muco-purulent material from the left nostril.

The mass was firm to the touch, and did not show any evidence of breaking down. There was some involvement of the glands, particularly of the left side of the neck.

Dr. Elting, of Albany, a general surgeon, saw the case with me and agreed that the tumor was inoperable. The child was admitted to the Child's Hospital on January 14th, and it was decided to try mixed toxins (erysipelas and bacillus prodigiosus,—Coley's serum), following the method advised by Coley (*Journ. Amer. Med Ass.*, March, 1906). A piece of the growth was removed for microscopical examination, and sent to the Bender Laboratory, with negative results. Here again, although a fairly large piece was removed, we probably did not go deeply enough to show the malignant character of the growth. Clinically, however, there was no doubt at all about its malignant nature.

The injections of the serum directly into the mass were started a few days later. We started with m. 1-3, increasing m. I or more each time. We got no reaction until January 25th, after the injection of m. III into the mass. Temperature rose to 103.4° F. Pulse, 136. On the following day the temperature was down to 99° F.

There was another reaction (temperature 102° F., pulse 160), after the use of m. IV of the serum. On February 3rd, a hemorrhage from the nose and throat, lasting about an hour, occurred, and was controlled with adrenalin and ice.

The amount of the serum was steadily increased, and another reaction (temperature 102.6° F., pulse 140), obtained, when m. VIII were injected. Reactions were also obtained when m. XIV and XVI were used. The injections were given at first every other day and finally every day, as much as m. XX being used.

The patient breathed with difficulty during the night of March 4th, and died on the morning of March 5th. Adrenalin injections were not used in this case, because the method is slow, and the child's condition was so bad that we thought prompter results would probably be obtained with the mixed toxins. Iodide of potash had been used without any result, and had to be stopped because it greatly increased the difficulty in breathing, by producing an oedema of the mucous membrane.

For a few weeks after the serum injections were started, the child appeared to improve, the breathing being easier, and the growth apparently becoming a little smaller.

On the whole, however, in this case at any rate, the use of Coley's serum did not do any good. It certainly did not produce the slightest softening of the growth. The autopsy fidings were as follows:

The Bender Hygienic Laboratory.

Name. Anna S. No. 0-1108. Date. Mch. 6, 1907.
(Dr. Robinson.)

Aged, 8 years. Child's Hospital. Service of Dr. Theisen.

Clinical Diagnosis.—Sarcoma of soft palate.

Body is that of a fairly well-built, poorly nourished female child, measuring 123 cm. in length. Rigor mortis absent. Pupils unequal, the right being dilated and measuring 5 mm. in diameter; the left contracted and measuring 1.5 m. in diameter. A ptosis of the left upper eyelid is present. The cervical lymph nodes on both sides, but especially on the left, are enlarged and readily palpable.

On exposing the abdominal cavity, the intestines are seen to be distended with gas, the appendix is bent on itself and bound to neighboring tissue by firm fibrous tags. The mesenteric lymph nodes are apparently normal; pleural cavities, normal; pericardium, normal; heart, normal; lungs, normal; liver and gall bladder, normal; spleen, normal; stomach and intestines, normal; kidneys, normal; adrenals, normal; pelvic organs, normal; aorta, normal; neck, the left lateral aspect of the neck downward from the left ear is slightly prominent and some enlarged lymph nodes are felt. The mouth is two-thirds filled, principally on the left side, with a firm, globular growth attached more at the left side of the junction of the soft with the hard palate, which extends from there to the side of the cheek down along the side and back of the pharynx on the

left, and is most intimately adherent to the left side of the pharynx, especially to the pterygoid process, and as far down as the gullet. The tongue fills the lower part of the oral cavity and the growth the upper part, both meeting tangentially as two spheroids, make it appear as if the communication with the pharyngeal opening was obliterated, but the obstruction is only apparent, and a finger can be readily introduced between the tongue and tumor into the pharynx.

By incision along the oral attachments of the tumor and by loosening up the pharyngeal attachments, the treachea, larynx, esophagus and tongue can all be removed with the growth.

The tumor consists of a pinkish-white, roughened, irregularly lobulated mass of tissue measuring about 7x4x4.5 cm. It involves the entire soft palate, the pillars of the fauces on both sides, the left side of the pharynx from the pharyngeal vault, downward to a level with the epiglottis, the lower and right-hand portion filling in the space above the epiglottis, but being free and unattached in this part, the attachment on the left side supporting the growth.

On section, the surface is homogeneous in appearance with no coarse connective tissue stroma, but apparently very cellular. The tissue is glistening and semi-translucent, of uniform consistency and of an elastic nature. On a level with the upper margin of the thyroid cartilage and to the front of the lateral border of the mass above described is a smaller, but similar mass measuring 3x2.5 x2.2 cm., probably a group of enlarged cervical lymph nodes.

Anatomical Diagnosis.—Sarcoma of pharynx. Enlargement of cervical lymph nodes. Chronic periappendicitis.

Microscopic Description.—Sections through the tumor show tissue which in most parts is densely cellular. The cells have deeply staining somewhat vesicular, oval or spindle shaped nuclei with little or no intracellular substance. In places the cells are arranged in fascicles, which cross and interlace and here the structure is less dense than elsewhere. Connective tissue trabeculae penetrate in various portions, and oedema of some areas is present. Blood vessels are abundant and fairly well formed. The enlarged lymph nodes in connection with the tumor do not show an invasion by the growth. A marked hyperplasia of the lymph follicles and lymphoid elements exists.

Microscopic Diagnosis.—Spindle celled sarcoma with hyperplasia of neighboring lymph nodes.

J. O. ROBINSON.

The following case reported by Halsted (Trans. Amer. Laryngol. Rhinol. and Otol. Soc., 1897), was somewhat similar to the writer's:

Emma R., aged 2 years, was brought to consult him on May 6, 1896. The child's respiration was labored, noisy and rapid, skin of the face of a milky pallor, with marked cyanosis, and the child was only partially conscious of its surroundings.

On examination, the right side of the nose was seen to be occluded by a growth projecting externally. Left nostril was also occluded. The soft palate was pushed forward by a mass presenting itself in the oro-pharynx. There was no ulceration. The child's dyspnoea was so great that Halsted performed tracheotomy almost immediately. Twenty-four hours later there was a hemorrhage through the tube. The child took no nourishment and died two days after the operation. A histological examination of the specimen obtained at autopsy showed it to be a sarcoma.

Melville Black (*Colorado Med. Jour.*, April, 1901), has reported a case of papilloma of the soft palate, turning into sarcoma, in a child 11 years old. Two large tumors of the soft palate were removed, which microscopically were reported to be papillomata. There was a recurrence four weeks after the operation, and an examination then showed the tumor to be a round celled sarcoma. Child died.

Another case of round-celled sarcoma of the pharynx has been reported by Hanszel (Ber. d. Wiener laryngol. Gesellsch., January 9, 1902), in a child 3 years old. The author states it developed as a phlegmonous angina.

Schmidt has reported a case of sarcoma of the soft palate in a boy 12 years old. A radical operation was performed, but the final result is not given. (Adolf Schmidt. Alveolarsarcom des weichen Gaumes. *Münch. Med. Wchnschr.*, No. 10, 1894.)

A case of fibro-sarcoma of the naso-pharynx has been reported by Mermet (Soc. Anat., Paris, July 14, 1894.) A tumor as large as an egg, probably originating in the inferior turbinate, posteriorly, hung down into the pharynx. It occurred in a girl 16 years old.

Another case in a girl of the same age, was observed by Simpson. (Trans. Amer. Laryngol. Ass., 1893). This was a sarcoma of the soft palate, and another example of the degeneration of a benign into a malignant growth. The soft palate was removed. Death resulted eight months after the operation, and over two years after the development of an apparently benign growth.

To consider briefly now the result of the treatment of sarcoma of the pharynx in children, the outlook, judging by the reported cases, is not very promising.

W. B. Johnson, however (*N. Y. Med. Record,* 1894), has reported a case of sarcoma of the palate successfully treated with the toxine of erysipelas. The patient, a girl 16 years of age, had a sarcoma involving the soft palate, posterior wall of the pharynx and epiglottis. The mixed toxins were used and after nine months treatment, great improvement resulted. The growth "nearly" disappeared.

Hanszel (*Monatscher, f. Ohrenh.,* No. 19, 1902), also reports a case of improvement in a sarcoma of the pharynx as the result of a streptococcus and staphylococcus infection.

Sarcoma of the pharynx in adults will not be considered in the writer's paper.

Emerson has recently reported a case in an adult, in which the use of Coley's toxines resulted in the practical disappearance of the growth. There was a recurrence and death after seventeen months. (THE LARYNGOSCOPE, March, 1907).

There are also several cases on record in which the arsenic treatment resulted in some improvement. I could not find any record of its having been used in sarcoma of the pharynx in children.

CASE OF OTOSCLEROSIS.*

BY GEO. E. SHAMBAUGH, M.D., CHICAGO.

The case I have to present is one suffering from an ear lesion, which today occupies the central point of interest in clinical otology.

He presents, in a large measure, many of the characteristic clinical symptoms of this condition. The young man is 15 years of age, and has had no previous ear trouble. There is, however, distinct history of hereditary ear trouble. His father, who is also quite hard of hearing, tells me that in past generations there were a number of instances of intermarriages of first and second cousins. He has a brother who has for many years been quite deaf. The father dates his own ear trouble from the time when he was ten years old, when he had an attack of scarlet fever. There has been a gradual loss of hearing from that date until the present. On examining his ears I find the drum membranes show no scarring or any evidence of a past suppurative process, and aside from a considerable degree of thickening, appear quite normal.

In making the functional examination it was necessary to shout in order that he might hear at all in either ear. He was unable to hear any of the tuning forks by air conduction. Even the piercing tones of the c^4 fork were entirely lost. No hearing for any part of the range of the Edelmann Galton Whistle was present. On the other hand, the bone conduction was still moderately prolonged. There was no distinct lateralization in the Weber test, and the Rinné was, of course, absolutely negative.

The patient I present began to lose his hearing only about three or four years ago. He dates the onset of the trouble from a severe cold in the head, when he suffered for a short time from pain in both ears. The onset of the deafness, however, was very gradual and there is a question whether his present ear trouble bears any relation of cause and effect to the severe cold in the head. The patient's hearing has grown slowly but steadily worse since it began. At no time has there been any distinct tinnitus aurium. The only clearly defined sensation referable to the ears has been a subjective sensation of fulness, which is much more marked during unsettled weather.

On examining the patient, the tubes are found to be normally open, both ears are readily inflated even by the Valsalva method. The drum membranes are normal in all respects, except for a decided reddish glow which is transmitted through the drum membrane, especially on the right side, from a congestion of the mucous mem-

* Read before the Chicago Laryngological and Otological Society, February 19, 1907.

brane over the promontory. The same condition has been noted on the left side, but is not so marked at present.

The functional tests give the characteristic reactions for a profound obstruction in the sound conducting mechanism, an obstruction which can only be accounted for by a more or less fixation of the key to the sound conducting apparatus, namely, the foot plate of the stapes. There is complete loss for all tones at the lower end of the scale; even c fork 64 d. v. is not heard in either ear. On the other hand, the c^6 tuning fork is heard quite normally in both ears. The lateralization in the Weber test is toward the more affected ear of the two. The Rinné is decidedly negative. The Schwabach test shows a pronounced prolongation of the bone conduction.

The negative Rinné, the lateralization to the more affected ear, and the prolongation of the bone conduction, together with a loss of the lower part of the scale, are, of course, characteristic of all obstructions in the conducting mechanism. In this case, however, the Rinné is so markedly negative, the loss of the lower part of the scale is so extensive, and the prolongation of bone conduction is so pronounced, that these symptoms could arise only from a decided fixation of the foot plate of the stapes.

A localized catarrhal process in the middle ear about the fenestra vestibuli, would hardly account for symptoms as marked as they appear in this case.

There is, in addition to these reactions, a loss of the highest tones of the Galton Whistle. He does not hear in either ear anything of the Edelmann Galton Whistle above the mark 7.

The diagnosis is clearly one of otosclerosis. The loss of the highest tones is, of course, a secondary symptom due to the involvement of that part of the organ of Corti just internal to the promotory.

In his father's case, the diagnosis of an otosclerotic process in an advanced stage is equally clear. The points of special interest here are: In the first place, the hereditary causative factor with the history of the intermarriages, which is often recognized in otosclerosis; in the second place, the characteristic reddish glow of the membrane tympani transmitted from the promontory; in the third place, the loss of the upper end of the scale which is a strong confirmatory evidence that the perception of the highest tones takes place in the lower end of the cochlea, that is the part which forms the promontory.

100 State St.

FORMIDINE IN AFFECTIONS OF THE EAR, NOSE AND THROAT.

BY OTTO J. STEIN, M. D., CHICAGO.

Quite a long time ago, I was asked to subject a new synthetic preparation called methylen disalicylic acid iodide or Formidine to clinical tests, in order to determine its value in ear, nose and throat cases. For this purpose I utilized the abundant material at my service at the Post-Graduate Hospital, and later, on account of the good results obtained, I was led to employ it in my private work. I have subjected the preparation to various severe tests in many cases, and the good results following its use incline me to the opinion that in methylen disalicylic acid iodide, we have a much better preparation than iodoform, for which it acts as an admirable substitute. The following cases have been taken at random out of several hundred, just to show the broad range of its application.

The powder is very finely divided, and on account of its adhesive qualities very little is required to coat the diseased mucous membrane. It is also admirable for impregnating gauze, and is not unpleasant to handle, as it is practically devoid of odor. It does not cause dermatitis, and does not stain the tissues as iodoform does. At my clinic at the Post-Graduate, it has been used in the treatment of a great number of cases in the following forms, powdered formidine, 25% mixture in glycerine, formidine gauze, 2% formidine ointment and a 20% formidine ointment.

The powdered form was used on operated surfaces, as after submuco-perichondrial resections of the nasal septum; turbinotomies and turbinectomies; cauterization of the turbinals; removal of septal ridges; mastoid operations and radical frontal sinus operations, and also in suppurating conditions of the nose and ear, like tubercular and syphilitic ulcerations; simple traumatic ulcerations, and chronic suppurative otitis media. Aside from these conditions, the powder has been used in a series of hypertrophic rhinitis cases, with the result of seemingly having reduced the amount of hypertrophy. The powder, when dusted on an inflamed or highly congested membrane in the nose or ear at times produces a smarting sensation, which is of very short duration, although in one or two cases it lasted longer.

It is remarkable that such an amount of formic aldehyde as 5 per cent. liberated in this preparation should not provoke greater discomfort, especially in the nose, which is very susceptible to this drug, but I interpret this as due to its very gradual liberation. The preparation is represented as a true chemical compound with the formula, C^{15} H^{10} O^{6} I^{2}, dissolving slowly in the alkaline organic secretions and developing the characteristics of its constituents, iodine 47%, salicylic acid 51% and formic aldehyde 5%.

The formidine gauze was prepared by dusting plain sterile gauze with the powder, and has been used in a large series of chronic otitis media suppurative cases, as well as in the latter stage of the acute otitis media suppurative cases. The ointments and the glycerine mixture have been applied to the various ulcerative conditions within and around the nose, like syphilis and tuberculosis, excoriated alæ, perforated septum, etc. In the treatment of atrophic rhinitis with incrustation of fetid discharges the nostrils were packed with a wool tampon covered with the ointment or glycerine mixture, the wool being preferable to cotton on account of its elasticity and wiry character. It thus holds the medicament in constant and immediate contact with the tissues, allowing prolonged effect of the drug.

CASE 1. H. B., female, aged 21 years, had suffered since childhood with chronic suppurative otitis media. The condition was bilateral. The prominent symptoms were continuous purulent discharge and deafness. The radical mastoid operation was performed, using formidine gauze and formidine powder in the after-treatment. Healing took place rapidly, with no evidence of infection of the incisions.

CASE 2. J. B., female, aged 49 years. Had a bilateral chronic suppurative otitis media for many years. The entire drum membrane and the ossicles on one side had been destroyed by the suppurative process, exposing an enormous carious cavity including antrum and cells. The ear was cleansed thoroughly at each treatment, and the eroded surface touched with trichloracetic acid, and then dusted with formidine powder and packed with gauze. Later the gauze was omitted. The entire cavity healed promptly under this treatment. I saw this patient the other day, two years after, and the ear had remained absolutely dry and healed.

CASE 3. M. J. B., female, aged 30 years; syphilitic. She was suffering from catarrhal symptoms and had a large perforation of the nasal septum and ulceration of the anterior ends of both lower turbinals. Received internally anti-syphilitic treatment, and the nose was treated by cleansing the ulcerated surfaces, followed by an oily spray, and then insufflations of formidine powder. The disagreeable nasal symptoms promptly subsided.

CASE 4. W. P., male, aged 35 years; postal clerk; has had a purulent discharge from both ears for twenty-five years. Two years ago the discharge from the right ear ceased. There was a low perforation of the left drum membrane, and a sinus in the roof of the canal discharging watery pus. A probe passed through this sinus into the attic led in the direction of the antrum, and exposed bone was easily felt. A radical mastoid operation was performed, and formidine powder was used in the after treatment, but the patient was worried because it discolored the discharges, so its use was discontinued.

CASE 5. L. R., male, aged 13 years; has had a chronic discharge from the right ear for three years; the drum membrane was entirely destroyed, and the middle ear full of granulations and pus. The radical mastoid operation was done, and in the after-treatment no gauze packing was used at all. The cavity was mopped dry and dusted with formidine powder. Three weeks after the operation the wound was dry and the patient was discharged.

CASE 6. L. T., female, aged 8 years. Complained of a discharge from the right ear for two years, accompanied with deafness. The ear was dusted with formidine powder, and after four months' treatment it was absolutely healed, and remained so until the present time, one year.

CASE 7. W. P. S., male, aged 33 years. Had a perforation of the right drum membrane and a profuse sero-mucous discharge from the middle ear of several weeks' standing. The discharge was checked within ten days, and the edges of the perforation stimulated so that it closed, after another week's treatment with formidine powder.

CASE 8. J. E. S., female, teacher, complained of severe pain in ear and deafness. The entire ear and the face about the ear was swollen, and the meatus closed by a crop of furuncles, causing intense pain. In this case I deviated from my usual custom of incising the boils, and instead introduced a firmly-fitting tampon of cotton covered with formidine powder. The improvement was rapid, immediate and lasting.

CASE 9. M. Z., male, aged 60 years, acute tubercular otitis media. The dry treatment with the powder dusted on the gauze was used for a period of twenty-one days, after which the ear remained dry.

CASE 10. A. W., aged 7 years, ulcer of the anterior septum, and

CASE 11. H. W., aged 14 years, ulcer of anterior septum, are brothers. The ointment was used at first, but on account of the difficulty of keeping any ointment in contact long enough in the nose unless applied on a tampon, the oil spray followed by the powder was used, but it took six weeks before they entirely healed.

CASE 12. M. B., female, aged 30 years, chronic suppurative otitis media.

CASE 13. A. J., male, aged 10 years, chronic suppurative otitis media.

CASE 14. M. L., female, aged 36 years, chronic suppurative otitis media.

CASE 15. G. L., male, aged 11 years, chronic suppurative otitis media. These four cases were treated with the powder and gauze and the discharge ceased entirely after three to six weeks, and have remained so from six months to a year later.

CASE 16. N. F., female, aged 35 years, ulcer of septum.

CASE 17. H. P., male, aged 21 years, ulcer of septum.

CASE 18. H. G., male, aged 9 years, ulcer of septum. In these three cases the oil spray and powder was used three times a week for three or four weeks, at which time they were healed.

CASE 19 and CASE 20 were cases of acute otitis media, in which the gauze and the powder were used six to eight days after the spontaneous appearance of the discharge. In both cases the ears were dry within ten days.

CASE 21 and CASE 22. Miss G. and R. T., atrophic rhinitis with ozena. The ointment on large wool tampons is used; one nostril is tamponed at a time, which is allowed to remain twelve to twenty-four hours. These cases are still under treatment, but show considerable improvement.

100 State street.

Esophagoscopy for Foreign Body. HERMANN von SCHROETTER. *Monatschr. f. Ohrenh.*, Berlin, Nov. 1904.

The author reports a case of a boy 16 years old, who had been suffering from a traumatic stricture of the oesophagus since infancy. He had been taught to pass a bougie himself, and was able to keep himself comfortable until two weeks before consulting the author. At that time he had swallowed a bone, which lodged in the oesophagus at the site of the stricture. The foreign body was distinctly and easily seen in the esophagoscope, but it had become impacted in the stricture. After some difficulty in prying it loose, he was successful in removing it. YANKAUER.

CLINICAL NOTES ON THE ACTION OF A NEW IODINE PREPARATION IN NOSE AND THROAT WORK.

BY FREDERICK MENGE, M.D., CHICAGO, ILL.

In operations upon the accessory sinuses, iodoform has served a most useful purpose as a dressing, but the disadvantage of its odor and staining property are so marked that any really efficient substitute which does the same work, and at the same time does not possess these extremely disagreeable features, would be very acceptable to all surgeons who do nose and throat work.

An article by Ford*, in which he related his experience with methylene disalicylic acid iodine (formidine) used as a glycerin emulsion in large abscesses, first attracted my attention to this substitute, and he also stated that his use of the preparation as a dusting powder had been very satisfactory; that there was no odor from it; that it did not stain the tissues and dressings and that it caused no irritation. Such a dressing I had long been looking for, so I determined to try formidine. The results are set forth in the following case histories.

CASE 1. Mrs. R., aged 35 years, married, housewife, had been suffering for twelve years with an infection of the antrum of Highmore, which had finally caused considerable necrosis. The radical operation was performed, and the wound packed with gauze prepared with formidine instead of iodoform. The result was an absolute cure. There has been no indication of a recurrence in one year.

CASE 2. Mr. F. S., aged 40 years, married, farmer, had an antrum infection. There was pus discharged through the nose and marked ozena. The antrum was opened, curetted and packed with formidine gauze. The ozena had disappeared on the third day. The opening in the alveolar process was allowed to close in three months. There has been no return after a period of ten months.

CASE 3. Mr. P., aged 50 years, married, farmer, had an infection involving the anterior ethmoidal cells, the frontal sinuses and antrum. The frontal sinus, antrum and ethmoidal cells were all opened and packed with formidine gauze. The patient reports a good recovery and there was no irritation set up by all these packings.

The antrum in each of these cases was redressed daily, a new gauze packing being put in, covering a period of three months. No irrigation of any kind was used. Bacteriologically the infection in each of these cases showed staphylococci.

34 Washington street.

* FORD: "A New Substitute for Iodoform," *Therapeutic Gazette*, March, 1907.

INSTRUMENTAL AIDS TO BRONCHOSCOPY AND ESOPHAGOSCOPY.

BY CHEVALIER JACKSON, M. D., PITTSBURGH, PA.

The ingenious safety pin closer of Dr. Harris P. Mosher is such a successful instrument that I have taken the liberty of modifying it to increase the facility of its use. I have had the ring hinged so that it lies in the same plane as the stem during introduction, until it passes the pin, when by means of the handle it is turned to a

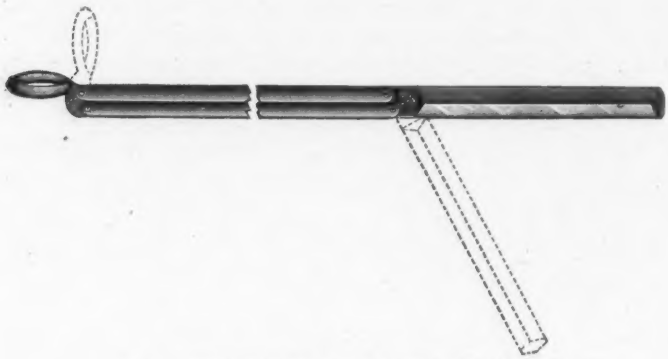

Fig. 1. Author's Modification of Mosher's Safety-Pin Closer.

right angle with the stem below the pin. Then the forked instrument of Mosher is used to push the pin down into the ring. In case of a small pin, the ring is sufficiently small to go through the esophagoscope. If a very large ring is needed, the closer can be first introduced past the introitus, then the esophagoscope is threaded over the handle and stem of the closer or better still, alongside the closer. In the latter method, when on inspection through the esophagoscope the tube mouth arrives at the ring of the closer, both may be pushed down together until the pin is reached, when the tube is stopped and the closer pushed down until the ring is below the pin. Of course a closer is only needed in case of a pin whose uncovered point sticks upward. In some instances it is easy with forceps and hook to get the point into the mouth of the

esophagoscope. Care must be taken that the instruments do not wound the esophagus. It is one of the most sensative organs in the

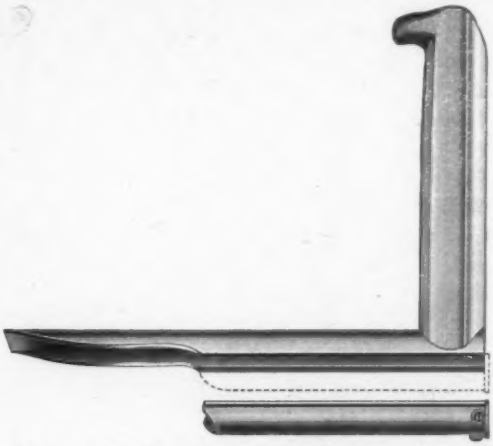

Fig. 2. Author's Separable Spatula for Tracheo-Bronchoscopy.

body. Its intolerance of injury is the chief reason why we need a safety pin closer.

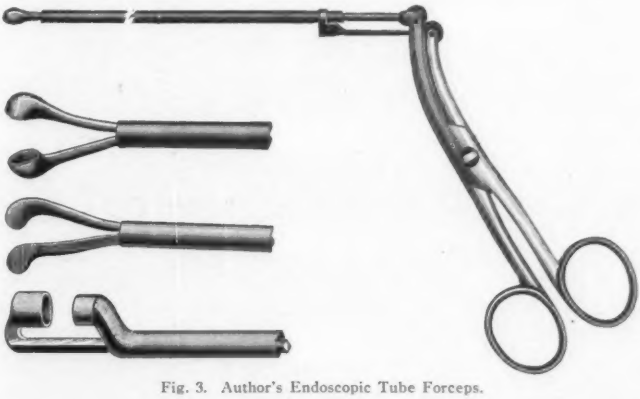

Fig. 3. Author's Endoscopic Tube Forceps.

The split tube spatula of Dr. Gustav Killian has so greatly facilitated the introduction of tracheo-bronchoscopic tubes, that a modi-

fication in use by the writer seems worthy of mention. Being separable horizontally there is no danger of wounding the mucosa when the instrument is used by the less skilful.

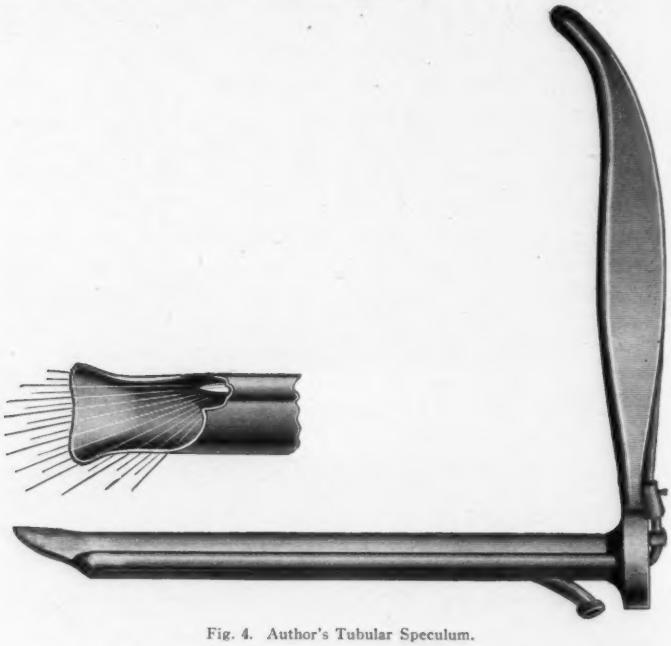

Fig. 4. Author's Tubular Speculum.

The tube forceps shown in Fig. 3 are so designed that the tube is pushed over the jaws and the jaws are not pulled into the tube, so that they do not retreat from their bite. Various patterns of jaws and varying lengths of canulae may be used interchangeably.

Fig. 5. Endolaryngeal Knife for Use through the Tubular Speculum.

The tubular speculum (Fig. 4) is of value for all kinds of endolaryngeal work. Specimens may be taken, benign growths may be removed, galvanic, faradic and galvano-caustic applications may be made, edematous masses punctured and all endo-laryngeal surgery done with an accuracy otherwise impossible.

430 Park Building.

EDITORIAL.

MISTAKES OF PHYSICIANS.

It may be deemed ungracious to write of the mistakes of other physicians, and more particularly when errors of judgment entail fatal consequences, and it may seem suicidal to confess one's own blunders, but the welfare of the race is paramount to the interests of individuals.

There are fundamental principles which should underlie the conduct of physicians and govern their actions and their relations, both with each other and with their patrons. Referring first to some faults of the specialists, and second to those of the general practitioners, we are driven to the conclusion, with regard to the former, that many of them are guilty of committing a serious mistake when they undertake to confine themselves exclusively to a special branch of practice from the time when they obtain their medical degree. The inevitable tendency of such a course is a regrettable narrowness, which a few years of general practice would forestall. Five years of such an experience (the writer had fifteen) would lay a foundation, upon which one could establish a more masterful grasp of the subjects of the specialties and render his services generally more to his own satisfaction and of greater value to his patients. It broadens the horizon and enables a man to measure up to the liberal standard of a well-equipped, all-around physician, and to recognize the various diseased conditions which may require the attendance of specialists in other lines, or of general practitioners.

The following cases will serve to illustrate this contention: An eye specialist was called in consultation by a general physician in a case of suppuration of the middle ear with mastoiditis. The nature of the disease was not recognized in time to avert an intracranial involvement and death, although an ear surgeon would have detected the conditions readily. Had it been an eye disease, a better consultant could not have been called.

A physician from a distant city referred a patient to me for a mastoid operation, but, before seeing me, the young lady was piloted (I do not say pirated) to a specialist in operative surgery, who operated upon her, with the result of producing a facial paralysis. The distortion of her features so shocked the fine sensibilities of the pa-

tient that she declared she had rather be dead than so hideously deformed." The operating surgeon, who has long since gone to his reward, was highly accomplished in the field of general surgery, but made the mistake of invading the domain of the specialist in aural surgery.

Here is another illustration of the same deplorable usurpation of an unfamiliar department of surgery: A general surgeon, with an enviable reputation as such, performed a mastoid operation on a patient for suppuration of the middle ear and mastoid process. Seven months after the operation the suppuration of the ear continued, a keloid growth occupied the site of the mastoid scar, and a polypoid mass filled the space which was originally the external auditory canal. There was no hearing in the affected ear except by bone conduction, and facial paralysis was added to the pitiable results. The new growth was removed from the canal, following which the hearing was good for ordinary conversation at a distance of more than 30 feet, but it required nine months of treatment to overcome the facial paralysis sufficiently to make firm closure of the eye and angle of the mouth possible. The fibres of the occipito-frontalis muscle remained paretic. The duplicate of these results has never occurred in the writer's practice, nor, indeed, a single example of complete, permanent facial paralysis from an operation. Such unhappy illustrations could be multiplied where it desirable to emphasize this phase of the subject.

The duties of the specialist and of the general practitioner often approach and overlap each other, dovetailing as it were, necessitating a comprehensive knowledge of the principles involved in the coördinate branches of medical practice, so as to conserve, first, ones own success and the patients' interests without duplicating the cost to them; and, second, to serve the patients intelligently and in good faith by intrusting their care to another, when necessary, in a line of practice in which the other is more skilled. One should not attempt to do what another can do better, speaking in a general way. Each man should confine himself to that which he can do best. This combination of specialized skill and conscientious coöperation among medical workers constitutes the ideal of modern medical practice.

The young physician may be depressed, at first, by the fear that he will not retain the patronage of all patients who consult him, but he should reflect that, if all physicians will adhere to the same high principles, he will be compensated by the mutual benefits resulting

from this reciprocity. And even if all his confreres do not evince this spirit of fraternal courtesy, he will eventually earn a reputation for efficient and fair treatment, which will bring its returns. But, if one is inclined to question this proposition, he should regard the feeling of having fulfilled the Hippocratic conception of the ideal physician as worth possessing. A consciousness of true worth and self-approval should be highly prized assets in one's stock ot manliness. No doubt such old-fashioned ideas will provoke a wink and a smile from the rare medical grafter, but life is too short and eternity too long to be disturbed by them. The rank and file of the medical profession are sincere, and worthy of the confidence reposed in them.

In order to elucidate the argument I will resurrect some illustrations that have come within my own knowledge, but they are so ancient as to work no injury to those who were involved:

A boy, 14 years old, was brought to the writer's clinic, suffering with pain in the ear. There were, also, pain, redness, swelling and tenderness in the region of the corresponding mastoid process. His mother was informed regarding the nature and danger of the disease, and it was endeavored to impress upon her mind the imperative necessity of daily treatment and constant attention to the case. This advice was totally ignored for several days, when the writer was sent for in urgent haste and found the boy unconscious, delirious, with inequality of the pupils and convulsive facial movements. A suppurative inflammation of the middle ear and mastoid process was plainly responsible for the symptoms. An incision disclosed a mastoid fistula; pus was liberated, the cavities were irrigated, the pressure relieved and the danger appeared to be over. The parents were informed that, notwithstanding the improved condition, it would be necessary to operate upon the bone in order to insure ultimate recovery; but they demurred. A few days passed, in which the boy seemed to be getting well. He was a bright little fellow and amused himself by beating a drum for the edification of the neighbors. Suddenly a relapse occurred; the parents were advised that further temporizing would be futile, and that, unless I were permitted to follow the dictates of my judgment, and to operate, I would not be responsible for the consequences. They decided to act upon the advice of their neighbors instead, who said: "Don't let Dr. Bishop butcher your boy," and I withdrew from the case.

Several days later I received a telephone message from Mercy Hospital stating that a boy whom I had previously attended had been brought to them in an unconscious condition, and that the physicians on duty were unable to make a diagnosis. It soon became evident that this was the patient just described, and I urged an immediate operation as the only means of saving him. However, as it was not convenient for them to operate at once, they preferred to wait until the following day, and asked if I would come at 9 o'clock in the morning. Before that hour arrived I was notified that the child had died during the night—a promising life sacrificed on the altar of prejudice and ignorance. Had I insisted at first upon operating, and had the parents permitted it when it was first advised, there is absolutely no doubt that the boy would have recovered.

Another lesson is that, with the symptoms of brain complications, a discharging ear and the evidence of the opening which I had made into a mastoid fistula, the nature of the malady was not recognized at the hospital and an operation, the only possible avenue of escape from a fatal issue, was not performed, although it may have been too late then to avail anything. In this connection one cannot lose sight of the fact that, had an operation been performed at the last moment and had it failed to prevent death, the parents and neigbors, wise and otherwise, would have attributed the death to the operation and not to the disease which killed, thereby justifying their ignorant warnings, and discounting the brilliant achievements of unhampered surgery. I have always blamed myself for not making the attendance upon this case conditional upon my right to exercise my own judgment from the first, or withdrawing from it as soon as my hands were tied, but, in extenuation, I may plead that this was my first sad experience of this kind.

Another occurrence which I have always regretted was the following: A young man, who was referred to me by a prominent eye specialist of Denver, was suffering from a chronic suppuration of both middle ears and bilateral mastoiditis. He was told at once that surgical interference would be necessary, but, as the symptoms were not then urgent, I did not insist upon an immediate operation. Before submitting to it, he fell into the hands of strangers, as I learned a year subsequently, became delirious, and was taken to the Cook County Hospital, where, it was said that he died of typhoid fever. All the evidence pointed toward an intracranial complication of the ear disease as the cause of death, but it was not recognized,

although the cardinal signs were conspicuously prominent—another valuable life consigned, metaphorically, to the human junk heap. I reproached myself afterward for not having demurred more strenuously to the delay, but one is sometimes at a loss to know how to address himself to such patients inorder to protect their interests and yet not to appear brutally blunt and heartless.

A physician came from a distant State and requested me to permit him to witness a number of mastoid operations. He remarked casually (which suggests the word casualty) that he "supposed one had to kill four or five patients before he learned how to operate successfully!" He had operated upon four patients and they all had died! I expressed my astonishment at such a proposition, since I had been performing these operations for many years without having had a death as the result of an operation. I do not say this boastfully. It is a matter of clinical history, and no doubt other operators who have observed the same precautions and methods can cite like results.

Another anomaly is worthy of our serious consideration: It is to be deplored that American physicians do not more generally separate the specialty of eye diseases from that of disease of the nose, throat and ear as is done by the leading European practitioners. Either specialty is large enough to tempt any ambitious man to master. It is argued that there is not enough work in one of them alone to afford a lucrative income, and that Americans have been educated, from an early day, to the idea of resorting to eye surgeons for ear treatment; but if the profession generally would segregate these branches of practice in conformity to their natural remoteness of relationship, it would eventuate in an equitable distribution of work, and the results would be more creditable and satisfactory, both scientifically and economically. The present unnatural association of the two specialties is productive of a vast amount of service which is indifferent—or worse. Men who are enthusiastic and skilled eye surgeons drift along on the borderland of ear, nose and throat diseases, with which they dally as a mere side-show to their favorite eye practice. Their heart is in the one, but the financial returns from the other specialty are too great a temptation to resist.

Only one illustration needs to be cited to show how Americans are wedded to this artificial union of two specialties: It was desired by some Chicago ear, nose and throat surgeons to refer eye cases to an eye specialist who would limit his practice to eye work, and

reciprocate their courtesy. A proposition was made to one of our most prominent ophthalmologists that, if he would practice ophthalmology alone, the coterie of specialists would refer all eye cases coming under their sphere of influence to him, and he, in turn, should refer patients falling within the lines of their specialty to them. The offer was rejected. So, this anomalous and inequitable situation still exists: The ear, nose and throat surgeon refers his eye patients to an eye surgeon, who, the patients observe, treats all diseases of both specialists, keeps all the cases referred to him and does not reciprocate by conferring a like favor. This peculiar practice is so well known that young men who are preparing to practice as ear, nose and throat specialties equip themselves to treat eye diseases also, as a matter of self-preservation. The natural segregation of these two specialties, as we find them in Europe with the resulting highest attainment of perfection, scientifically and practically, seems to be a very remote possibility in this new world.

Let us make a passing note of another mistake, which is made by the occasional type of physician who pretends to be a "specialist" in the line of any disease which he happens to have a chance to treat; but this mongrel exception only serves to prove the rule that the average physician is a foe to fakes. With all its imperfections, I have unbounded faith in the simple honesty of the great mass of the medical profession. In pure and unaffected charity, disinterested faithfulness to its trust, self-sacrificing devotion to duty and immolation for the promotion of humane activities, in heroism unheralded and unpublished, but none the less worthy to be recorded on the pages of enduring history, the medical profession stands without a peer. BISHOP.

ERRATA.

Prof. Gustav Killian's article entitled "Cauterization of the Four Susceptible Areas of the Nasal Mucosa" was not presented before the American Laryngological Association as stated in footnote on page 341, May issue.

Read "a small neck" for a "small needle" in 7th line from bottom of page 380, May issue.